SPORTSMAN AVIATION

F-20 TIGERSHARK 40

Almost Ready-to-Fly Sport-Scale Jet

INSTRUCTIONS FOR FINAL ASSEMBLY

The Sportsman Aviation F-20 Tigershark 40 ARF is distributed exclusively by Global Hobby Distributors
18480 Bandilier Circle, Fountain Valley, CA 92708

GLOBAL

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Kit Product Number 127520

Specifications:

- **Wing Span:** 47 Inches
- **Wing Area:** 535 Square Inches
- **Length:** 54 Inches
- **Weight RTF:** 5.5 - 6.5 Pounds
- **Wing Loading:** 23.6 - 28 Ounces Per Square Foot
- **Functions:** Ailerons, Elevator, Rudder & Throttle
- **Engine Required:** .40 - .53 Two-Stroke
- **Radio Required:** 4Ch or More w/4 Standard Servos

✦**IMPORTANT**✦ The Sportsman Aviation F-20 Tigershark 40 ARF is not intended for inexperienced pilots. It is in no way a trainer. If you are not comfortable flying fast sport aircraft, we strongly suggest returning the F-20 Tigershark 40 ARF (brand new, in the box with all original packaging and your dated sales receipt) to the place of purchase.

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SAFETY WARNING

This R/C airplane is not a toy! If misused or abused, it can cause serious bodily injury and/or damage to property. Fly only in open areas and preferably at a dedicated R/C flying site. We suggest having a qualified instructor carefully inspect your airplane before its first flight. Please carefully read and follow all instructions included with this airplane, your radio control system and any other components purchased separately.

FOR YOUR INFORMATION

To make your modeling experience totally enjoyable, we recommend that you get experienced, knowledgeable help with assembly and during your first flights. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors. If there is no hobby shop in your area, we recommend that you contact the AMA at the address below. They will be able to help you locate a flying field near you.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie IN 47302-9252
(800) 435-9262
www.modelaircraft.org

OUR GUARANTEE

Sportsman Aviation guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This does not cover any component parts damaged by use, misuse or modification. **In no case shall Sportsman Aviation's liability exceed the original cost of the purchased kit.**

In that Sportsman Aviation has no control over the final assembly or material used for final assembly, no liability shall be assumed for any damage resulting from the use by the user of the final user-assembled product. By the act of using the final user-assembled product, the user accepts all resulting liability.

INTRODUCTION

Thank you for purchasing the Sportsman Aviation F-20 Tigershark 40 ARF. Before completing the final assembly of your new airplane, please carefully read through this instruction manual in its entirety. Doing so will ensure your success the first time around!

MODELTECH F-20 TIGERSHARK 40 ARF FEATURES

- Pre-Built from High-Quality Balsa, Light Plywood and Foam
- Pre-Covered with Real Iron-On, Heat-Shrink Covering Material
- Sleek, Fast and Agile Design
- All Control Horns and Pushrods Enclosed Inside the Airframe for Less Drag
- Durable Steel Main Landing Gear and Nose Gear Strut
- Includes Most Hardware - Wheels, Fuel Tank, Pushrods, Engine Mount, Etc.
- Fast and Easy Assembly - Over 60 High-Resolution Digital Photos and Drawings to Guide You

This instruction manual is designed to guide you through the entire assembly process of your new airplane in the least amount of time possible. Along the way you'll learn how to properly assemble your new airplane and also learn tips that will help you in the future. We have listed some of our recommendations below. Please read through them before beginning assembly.

- Please read through each step before beginning assembly. You should find the layout very complete and straightforward. Our goal is to guide you through assembly without any of the headaches and hassles that you might expect.
- There are check boxes next to each procedure. After you complete a procedure, check off the box. This will help prevent you from losing your place.
- Cover your work table with brown paper or a soft cloth, both to protect the table and to protect the parts.
- Keep a couple of small bowls or jars handy to put the small parts in after you open the accessory bags.
- We're all excited to get a new airplane in the air, but take your time. This will ensure you build a straight, strong and great flying airplane.
- If you come across this symbol ☞, it means that this is an important point or an assembly hint.

If you should find a part missing or damaged, or have any questions about assembly, please contact us at the address below:

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18480 Bandilier Circle
Fountain Valley CA 92708

Phone: (714) 963-0329 **Fax: (714) 964-6236** **Email: service@globalhobby.net**

CHECK IT OUT! We urge you to come check out our website at http://globalservices.globalhobby.com. There you will find public message boards frequented by other Sportsman Aviation product owners and the Sportsman Aviation support staff. This is a great place to learn about new Sportsman Aviation products, get help and suggestions for your current Sportsman Aviation products or just simply hang out and chat with people that share your same interests.

To enable us to better serve your needs, please include your email address with any correspondence you send to us. Your email address will be added to our Customer Service Database so you will automatically receive free updates and tech notices for your particular product. You will also receive repair status updates (if applicable) and other important information about your product as it becomes available.

IMPORTANT INFORMATION ABOUT YOUR EMAIL ADDRESS

Global Hobby Distributors will not disclose the information it collects to outside parties. Global Hobby Distributors does not sell, trade, or rent your personal information to others . Your privacy is important to us.

SECTION 1: OUR RECOMMENDATIONS

This section describes our recommendations to help you in deciding which types of accessories to purchase for your new Sportsman Aviation F-20 Tigershark 40 ARF. **Please read through this entire section very carefully. We have provided you with tips and recommendations that, if followed, will result in a great flying airplane. Failure to follow our recommendations may result in a poor flying airplane.**

What Engine Should I Use?

The F-20 Tigershark 40 ARF flies very well using a strong .40 - .46 size two-stroke engine. The airplane is light enough that this size of engine will provide enough power for most fliers. It is on the low end of the recommended displacement range though, so don't expect the airplane to be too blazingly fast. The engine is mounted on its side, so your engine's stock muffler will work well.

For those flyers looking for a very fast airplane with a lot of power, we suggest using a .53 size two-stroke engine. A .53 size two-stroke engine typically has the same footprint as a .40 - .46 size two-stroke engine, yet is lighter and more powerful. This size engine will fit within the required engine mounting area and it won't require an after-market muffler. With this engine, the airplane will be very fast and have a lot of extra power for great vertical performance.

◆IMPORTANT◆ We don't recommend attempting to use a four-stroke engine in your F-20 Tigershark 40 ARF. The forward profile of the airplane is very small and therefore will not accommodate the larger physical size of a four-stroke engine. The airplane is designed specifically around .40 - .53 size two-stroke engines.

What Radio System and Servos Should I Use?

A standard four-channel radio control system with 3 standard ball bearing servos for the flight control surfaces and 1 standard servo for the throttle will be more than adequate. To get the most out of the airplane, we suggest using a radio control system that features dual rates, and, depending on where you end up needing to mount your receiver and airborne battery in the fuselage, you may also need several servo extensions.

What Else Do I Need?

The F-20 Tigershark 40 ARF includes most of the hardware you'll need to finish the airplane. You will need to purchase separately a spinner and some basic building materials, such as adhesives, protective foam rubber for your radio equipment, and fuel tubing. We've provided a list below of the items we used on the airplane shown in this instruction manual.

Here's a List of What We Used to Finish Our F-20 Tigershark 40 ARF:

QTY. 1	210760	Magnum XLS .52A Two-Stroke Engine
QTY. 1	237152	Magnum 2" Chrome Spinner*
QTY. 1	608560	APC 11 x 6 Composite Propeller
QTY. 3	759349	Hitec HS-425 Ball Bearing Servos
QTY. 1	444104	Cirrus CS-36 Standard Servo
QTY. 1	115559	Thunderbolt # 3 Performance Glow Plug
QTY. 1	115923	Global XX Silicon Fuel Tubing
QTY. 1	868638	Dubro 1/4" Protective Foam Rubber

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◆IMPORTANT◆ The part numbers listed for the Hitec servos are compatible with Hitec and JR radio control systems. These servos are also available with connectors that are compatible with Futaba and Airtronics radio control systems. The part number listed for the Cirrus standard servo is compatible with all name-brand radio control systems. This servo uses a universal connector.

*Spinner includes 1/4"- 28 crankshaft adapter.

SECTION 2: TOOLS AND SUPPLIES REQUIRED

The tools and supplies listed below will be necessary to finish the assembly of your F-20 Tigershark 40 ARF. We suggest having these items on hand before beginning assembly.

- ❑ Kwik Bond Thin C/A # 887500
- ❑ Kwik Bond Thick C/A # 887510
- ❑ Kwik Bond 5 Minute Epoxy # 887560
- ❑ Kwik Bond 30 Minute Epoxy # 887565
- ❑ Kwik Bond C/A Debonder # 887545
- ❑ Pacer Formula 560 Canopy Glue # 339176
- ❑ Pacer Z-42 Blue Threadlocker # 339162
- ❑ Lightweight Oil or Vaseline®
- ❑ # 1 & # 2 Phillips Head Screwdrivers
- ❑ 1.5mm & 2.5mm Hex Wrenches
- ❑ Adjustable Open-End Wrench
- ❑ Wire Cutters
- ❑ Needle Nose Pliers
- ❑ Excel Modeling Knife # 692801
- ❑ Scissors
- ❑ Electric Drill
- ❑ Assorted Drill Bits
- ❑ Dubro T-Pins # 567685
- ❑ Ernst Airplane Stand # 223977
- ❑ Rotary Tool w/Cutting Disc & Sanding Drum
- ❑ Ruler
- ❑ Pencil
- ❑ Builder's Triangle
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Waxed Paper
- ❑ Masking Tape
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks # 864204
- ❑ NHP Epoxy Mixing Cups # 864205

SECTION 3: KIT CONTENTS

We have organized the parts as they come out of the box for easier identification during assembly. Before you begin assembly, group the parts as we list them below. This will ensure that you have all of the parts before you begin assembly and it will also help you become familiar with each part.

If you find any parts missing or damaged, please contact us at:

Global Services
18480 Bandilier Circle
Fountain Valley CA 92708

On the Web
http://globalservices.globalhobby.com

Phone: (714) 963-0329 **Fax: (714) 964-6236** **Email: service@globalhobby.net**

AIRFRAME ASSEMBLIES

- ❑ (1) Fuselage w/Hatch Covers
- ❑ (1) Right Wing Panel w/Aileron
- ❑ (1) Left Wing Panel w/Aileron
- ❑ (1) Horizontal Stabilizer w/Elevator Halves
- ❑ (1) Vertical Stabilizer w/Rudder

THROTTLE CONTROL SYSTEM

- ❑ (1) 34" Pushrod Wire w/Z-Bend
- ❑ (1) Adjustable Servo Connector Assembly

NOSE GEAR ASSEMBLY

- ❑ (1) Prebent Steel Nose Gear Strut
- ❑ (1) Nose Gear Wheel
- ❑ (1) Nylon Steering Arm
- ❑ (2) Nylon Spacers
- ❑ (2) Wheel Collars
- ❑ (3) M3 x 5mm Machine Screws
- ❑ (1) 29" Pushrod Wire w/Z-Bend
- ❑ (1) Adjustable Servo Connector Assembly

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KIT CONTENTS, CONTINUED....

MAIN LANDING GEAR ASSEMBLY

- ❑ (2) Prebent Steel Main Landing Gear Wires
- ❑ (2) Main Gear Wheels
- ❑ (4) Nylon Landing Gear Straps
- ❑ (2) Nylon Spacers
- ❑ (2) Wheel Collars
- ❑ (8) M3 x 12mm Wood Screws
- ❑ (2) M3 x 5mm Machine Screws

AILERON CONTROL SYSTEM

- ❑ (2) 3-1/2" Threaded Wires w/90º Bend
- ❑ (2) Nylon Clevises
- ❑ (2) Nylon 90º Snap Keepers
- ❑ (2) Nylon Adjustable Control Horns (Large Thread)
- ❑ (2) Plywood Servo Tray Mounting Blocks (W26)
- ❑ (1) Plywood Servo Tray (W18)
- ❑ (6) C/A Style Hinges

RUDDER CONTROL SYSTEM

- ❑ (1) 8-1/2" Threaded Wire w/90º Bend
- ❑ (1) 2-1/4" Prebent Torque Rod w/Flange Bearing
- ❑ (1) Nylon Clevis
- ❑ (1) Nylon 90º Snap Keeper
- ❑ (1) Nylon Adjustable Control Horn (Small Thread)
- ❑ (3) C/A Style Hinges

FUEL TANK ASSEMBLY

- ❑ (1) 320cc Fuel Tank
- ❑ (1) Large Diameter Metal Plate
- ❑ (1) Small Diameter Metal Plate
- ❑ (1) Metal Neck-Reinforcement Ring
- ❑ (1) Rubber Stopper
- ❑ (1) Fuel Pick-Up "Clunk"
- ❑ (1) M3 x 20mm Machine Screw
- ❑ (1) Silicon Fuel Tubing
- ❑ (2) Aluminum Tubing

ELEVATOR CONTROL SYSTEM

- ❑ (1) 8-1/2" Threaded Wire w/90º Bend
- ❑ (1) 6-3/4" Threaded Wire w/Plain End
- ❑ (2) 2-1/2" Prebent Torque Rods w/Flange Bearing
- ❑ (2) Nylon Clevises
- ❑ (1) Nylon 90º Snap Keeper
- ❑ (2) Nylon Adjustable Control Horns (Small Thread)
- ❑ (2) Wheel Collars
- ❑ (2) M3 x 8mm Machine Screws
- ❑ (4) C/A Style Hinges

ENGINE MOUNT ASSEMBLY

- ❑ (1) Engine Mount
- ❑ (4) M3 x 18mm Socket-Cap Screws
- ❑ (4) M3 x 30mm Socket-Cap Screws
- ❑ (4) M3 Lock Nuts
- ❑ (12) M3 Flat Washers

MISCELLANEOUS WING PARTS

- ❑ (1) Plywood Wing Joiner (W17)
- ❑ (1) Balsa Leading Edge Support (W20)
- ❑ (2) Plywood Wing-Screw Doublers
- ❑ (1) Balsa Wing Fairing (Front)
- ❑ (1) Balsa Wing Fairing (Rear)
- ❑ (2) M5 x 40mm Machine Screws
- ❑ (2) M5 Flat Washers

MISCELLANEOUS FUSELAGE PARTS

- ❑ (1) Fiberglass Cowling
- ❑ (1) Clear Canopy
- ❑ (3) M3 x 6mm Wood Screws
- ❑ (9) M2 x 10mm Flange-Head Wood Screws
- ❑ (1) Length of Clear Tubing
- ❑ (1) Decal Set

Don't forget that we stock a complete assortment of replacement parts. If for any reason you should ever need to order replacement parts for your Sportsman Aviation F-20 Tigershark 40 ARF, don't hesitate to contact us. For your convenience, we have provided a replacement parts list, along with the part numbers for easy ordering convenience, on the next page. Contact your local Sportsman Aviation dealer for prices and availability.

SECTION 4: REPLACEMENT PARTS

Global stocks a complete line of replacement parts for your Sportsman Aviation F-20 Tigershark 40 ARF. Listed below are the replacement parts that are available along with their respective part numbers for easy ordering convenience. We suggest ordering directly from your local dealer. If your dealer does not stock Sportsman Aviation products, you can order directly from us at the address shown below:

Global Services
18480 Bandilier Circle
Fountain Valley CA 92708

Phone: (714) 963-0329 **Fax: (714) 964-6236**

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F-20 TIGERSHARK 40
Almost Ready-to-Fly Sport-Scale Jet

F-20 Tigershark 40 ARF - Complete	127520	Fiberglass Cowling	120456
Instruction Manual	120450	Main Landing Gear Set w/Wheels	120457
Wing Set	120451	Hardware Set	120458
Fuselage Set	120452	Decal Set	120459
Stabilizer Set	120453	Motor Mount Set	120460
Wing Fairings Set	120454	Nose Gear Assembly	120461
Canopy	120455		

SECTION 5: A NOTE ABOUT COVERING

The covering material used on the Sportsman Aviation F-20 Tigershark 40 ARF is real iron-on, heat-shrink covering material, not cheap "shelf paper." Because of this, it is possible with heat and humidity changes that the covering on your airplane may wrinkle or sag. This trait is inherent in all types of heat-shrink material. To remove any wrinkles that might be visible you will need to purchase, or borrow from a fellow modeler, a heat iron. If you need to purchase one, the **Global Heat Sealing Iron # 360900** is recommended.

Follow this simple procedure to remove the wrinkles:

❑ Plug in and turn on the sealing iron to the medium-high temperature setting. Allow the sealing iron to heat up for approximately 5 - 7 minutes.

❑ After the sealing iron has reached temperature, lightly apply the sealing iron to the wrinkled section of the covering. Move the sealing iron slowly over the wrinkled section until the covering tightens and the wrinkles disappear.

◆IMPORTANT◆ You will notice that the color of the covering will darken when it is heated. When the covering cools back down, it will return to its normal color.

☞ If the color layer smears from any of the seams the temperature of the sealing iron is too hot. Turn the temperature dial down and wait about 5 minutes for the sealing iron to adjust to the lower temperature. You can remove any excess color streaks using a paper towel soaked with a small quantity of Acetone.

PRO TIP We do not suggest storing your airplane in an extremely hot environment (like the back of your car in direct sunlight) for any length of time. The extreme heat could cause the covering material to wrinkle or sag and possibly damage canopy and the fragile components of the radio system.

SECTION 6: WING ASSEMBLY

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

- ❑ (1) Right Wing Panel w/Aileron
- ❑ (1) Left Wing Panel w/Aileron
- ❑ (1) Plywood Wing Joiner (W17)
- ❑ (1) Balsa Leading Edge Support (W20)

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

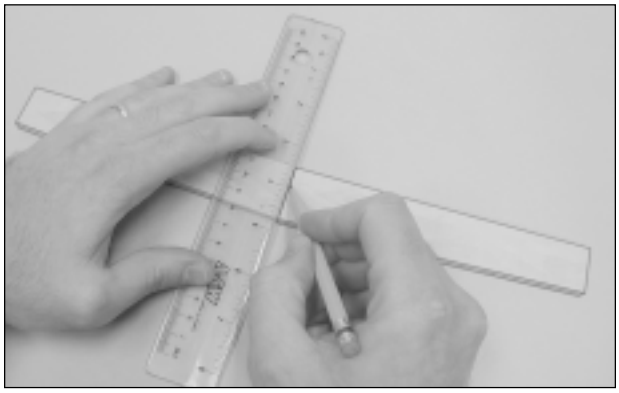
- ❑ Kwik Bond 30 Minute Epoxy
- ❑ Excel Modeling Knife
- ❑ Ruler
- ❑ Pencil
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Masking Tape
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

STEP 1: ALIGNING THE WING PANELS

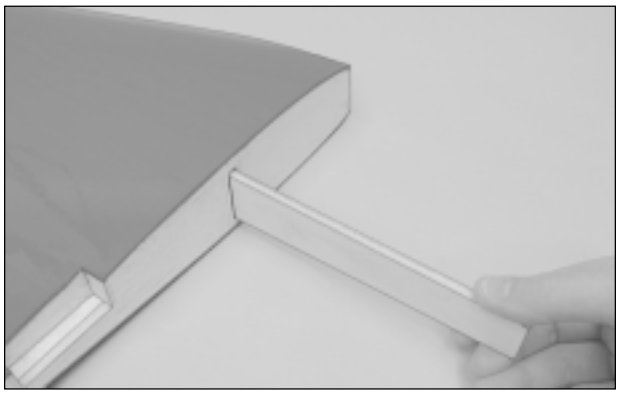
❑ Remove the aileron and three hinges from each of the two wing panels and set them aside for now.

❑ Using a modeling knife, cut away and remove the excess covering material that overlaps onto the root ribs of each wing panel, leaving about 1/16" overlapped so it does not pull away.

✦**IMPORTANT**✦ It's very important to the integrity of the wing center-section joint that you remove as much covering material from the root ribs as possible. Do not omit this procedure or the wing center-section joint may fail during flight.



❑ Use a ruler and a pencil to locate and draw a vertical centerline on each side of the plywood wing joiner.



❑ Test-fit the plywood wing joiner into the wing joiner box in each wing panel. It should slide easily into each wing panel up to the centerline you drew.

☞ If the wing joiner does not fit properly, use 220 grit sandpaper with a sanding block to lightly sand the edges and tips of the wing joiner, until you are satisfied with the fit.

✦**IMPORTANT**✦ The plywood wing joiner is cut in the shape of a shallow "V." Make sure that this "V" shape is toward the **top** of the wing panels.

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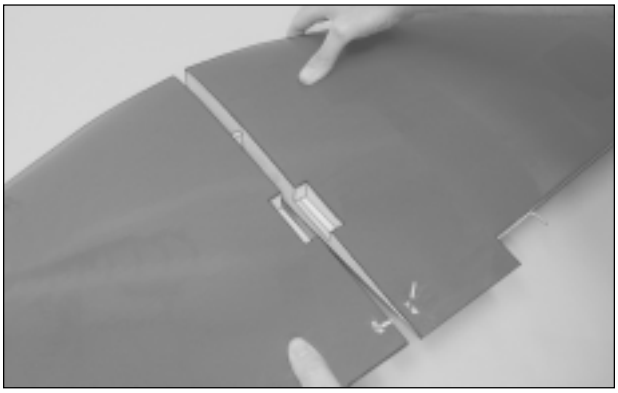

❑ Carefully slide both wing panels together with the wing joiner temporarily installed (without using glue).

◆IMPORTANT◆ When the wing joiner is installed, it should not fit tightly into the wing panels. It should actually be slightly loose. This will ensure that when you glue the wing joiner into place epoxy can get into the joints between the wing joiner and the joiner box. If the wing joiner fits too tightly, the epoxy will be pushed out of the joints when you slide the wing joiner into the wing, leaving no glue to secure it into place.

❑ While holding the two wing panels together firmly, make sure that both wing panels are lined up at both the leading and the trailing edges, then look carefully at the center-section joint: the wing panels should fit together tightly with few or no gaps in the joint.

☞ If the wing panels do not fit together properly, remove the wing joiner and use 220 grit sandpaper with a sanding block to lightly sand the edges and tips of the wing joiner, until you are satisfied with the fit.

STEP 2: JOINING THE WING PANELS

❑ When satisfied with the fit, pull the wing panels apart and remove the wing joiner.

❑ Apply a long strip of masking tape to the top and bottom edges of the root rib on each wing panel.

☞ The masking tape will prevent excess epoxy from getting onto the wing panels when you join them.

❑ Mix a generous amount of 30 minute epoxy. Working with only one wing panel for now, apply a thin layer of epoxy inside the wing joiner box and to only half of the wing joiner. Make sure to cover the top and bottom, as well as the sides, and use enough epoxy to fill any gaps.

◆WARNING◆ Use only 30 or 45 minute epoxy to install the wing joiner and to join the wing panels together. **Do not use 5 minute epoxy. It is not strong enough.**

❑ Slide the wing joiner into the wing panel up to its centerline. Quickly remove any excess epoxy, using a paper towel and rubbing alcohol, and allow the epoxy to set up before proceeding.

❑ After the epoxy has set up, test-fit both wing panels together again to double-check that they still fit together properly. Check the leading and trailing edges, too. It's important that they be even with each other.

❑ Mix a generous amount of 30 minute epoxy and apply a thin layer to the exposed half of the wing joiner, the inside of the wing joiner box in the second wing panel, and to the **entire surface of BOTH root ribs**. Make sure to use enough epoxy to fill any gaps.

◆IMPORTANT◆ It is of the utmost importance to the integrity of the wing center-section joint that you apply a generous amount of epoxy to **both root ribs** and to the wing joiner. Not using enough epoxy can result in wing failure during flight.

❑ Slide the two wing panels together and realign them. Quickly wipe away any excess epoxy, using a paper towel and rubbing alcohol, and use pieces of masking tape to hold the two wing panels aligned until the epoxy fully cures.

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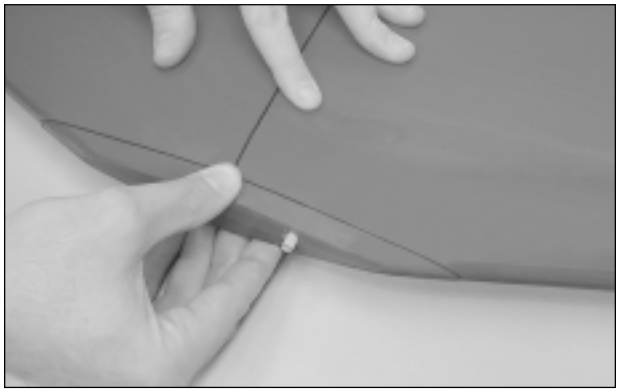
STEP 3: CHECKING THE WING CENTER-SECTION JOINT

❑ Once the epoxy has fully cured, remove the masking tape and double-check the center-section joint. If any gaps are present, mix a small quantity of 30 minute epoxy and carefully fill any remaining gaps. Quickly remove any excess epoxy, using a paper towel and rubbing alcohol, and allow the epoxy to thoroughly cure.

◆IMPORTANT◆ Do not omit this procedure. The wing panels should fit together tightly, but it's possible to have some small gaps that appear after the epoxy has cured. To make the wing center-section joint as strong as possible, it's important to fill any gaps, using 30 minute epoxy.

STEP 4: INSTALLING THE BALSA LEADING EDGE SUPPORT



❑ Test-fit the balsa leading edge support to the leading edge of the wing. It should fit firmly against the leading edge of the wing and the edges of the leading edge support should be even with the profile of the wing.

◆IMPORTANT◆ To get a perfect fit, you may need to slightly enlarge and/or elongate the predrilled holes in the leading edge support to fit around the wing hold-down dowels.

❑ When satisfied with the fit, cut away and remove the covering material from the gluing surfaces, then glue the leading edge support into place, using a generous amount of 30 minute epoxy. Remove any excess epoxy, using a paper towel and rubbing alcohol, and hold the leading edge support in place, until the epoxy completely cures, using masking tape.

SECTION 7: WING FAIRING INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

- ❑ (1) Fuselage w/Hatch Covers
- ❑ (2) Plywood Wing-Screw Doublers
- ❑ (1) Balsa Wing Fairing (Front)
- ❑ (1) Balsa Wing Fairing (Rear)
- ❑ (2) M5 x 40mm Machine Screws
- ❑ (2) M5 Flat Washers

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond 5 Minute Epoxy
- ❑ # 2 Phillips Head Screwdriver
- ❑ Excel Modeling Knife
- ❑ Electric Drill
- ❑ 13/64" Drill Bit
- ❑ Ernst Airplane Stand
- ❑ Ruler
- ❑ Pencil
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Masking Tape
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

STEP 1: INSTALLING THE REAR WING FAIRING

❑ Using a modeling knife, cut away and remove the covering material from over the top and bottom of the two predrilled holes in the trailing edge of the wing. The holes are located approximately 7/8" in front of the trailing edge and 2" out from the centerline.

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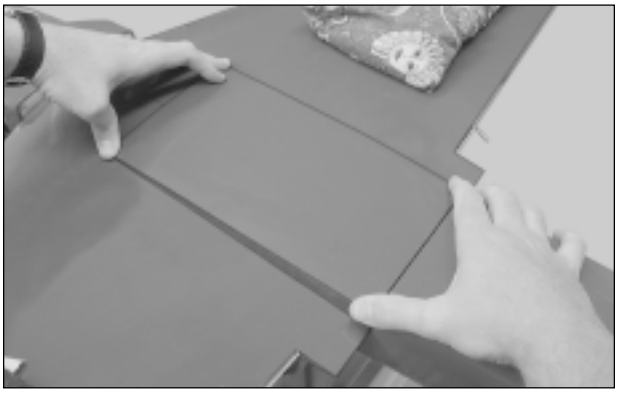
❑ Set the fuselage upside down in your airplane stand. Place the wing into the wing saddle, push it forward completely, then push the trailing edge down into place.

☞ Two holes have been predrilled in the forward bulkhead to accept the wing hold-down dowels in the leading edge of the wing.

❑ Align the predrilled holes in the wing with the predrilled holes in the wing mounting block inside the fuselage, then secure the wing firmly to the fuselage, using pieces of masking tape, or better yet, a couple of weights.

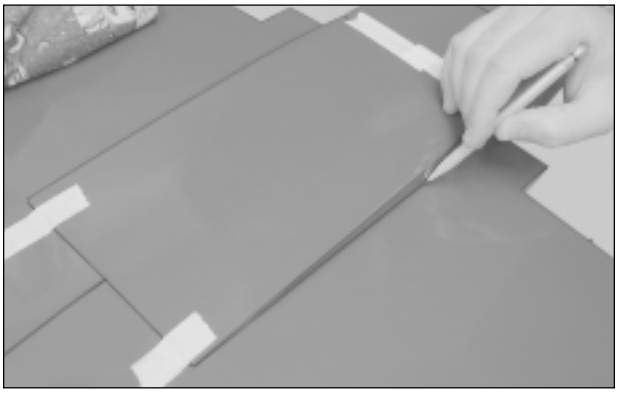
✦IMPORTANT✦ It's very important that the wing doesn't move during the next few procedures. It's also very important that the predrilled holes in the wing line up with the predrilled holes in the wing mounting block.



❑ With the wing held firmly in place, position the rear wing fairing onto the wing. When lined up properly, the sides and bottom of the wing fairing should be even with the sides and bottom of the fuselage, and there should be few or no gaps between the base of the wing fairing and the wing. The center of the wing fairing (at the front) should be centered over the wing centerline, too.

✦IMPORTANT✦ There should be a 1/16" wide gap between the back edge of the wing fairing and the fuselage.

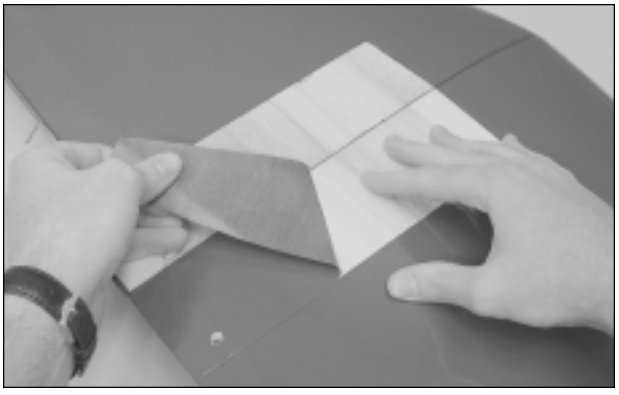
✦IMPORTANT✦ If there are gaps between the base of the wing fairing and the wing, use 220 grit sandpaper to sand away some material from the base of the wing fairing. Remove small amounts of material at a time and recheck the fit often, until you are satisfied with the fit.



❑ When satisfied with the fit and alignment, hold the wing fairing in place, using strips of masking tape.

❑ Use a pencil to draw an outline of the wing fairing onto the wing.

✦IMPORTANT✦ Again, it's very important that the wing not move. It must stay in alignment.



❑ Remove the wing from the fuselage, then remove the wing fairing from the wing and set it aside for now.

❑ Using a modeling knife, carefully cut away and remove the covering material from within the outline you drew.

❑ Using a modeling knife, carefully cut away and remove the covering material from the base of the wing fairing.

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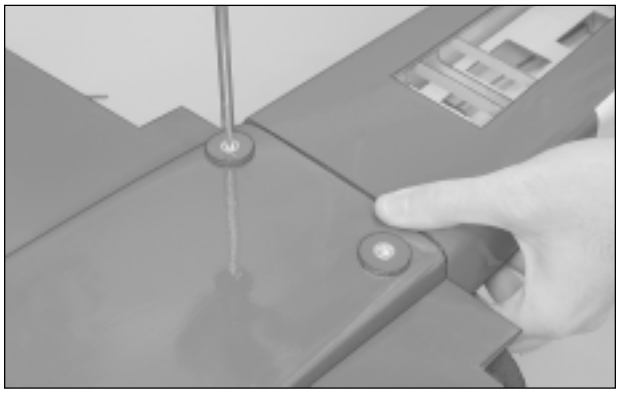
❑ Set the wing back into the wing saddle and realign it. Again, use masking tape or weights to keep the wing firmly in place and aligned.

❑ Mix a generous amount of 5 minute epoxy and apply a thin layer to the gluing surfaces of the wing fairing. Set the wing fairing back into place and realign it. Remove any excess epoxy, using a paper towel and rubbing alcohol, and hold the wing fairing firmly in place, until the epoxy sets up.

◆**WARNING**◆ Be careful not to get any epoxy between the wing fairing and the fuselage and/or between the wing and the fuselage. You don't want to accidentally glue the wing to the fuselage.

STEP 2: MOUNTING THE WING

❑ After the epoxy completely cures, remove the wing from the fuselage and use a 13/64" diameter drill bit to carefully drill open the holes in the wing through the wing fairing. Use the predrilled holes in the wing as a guide.



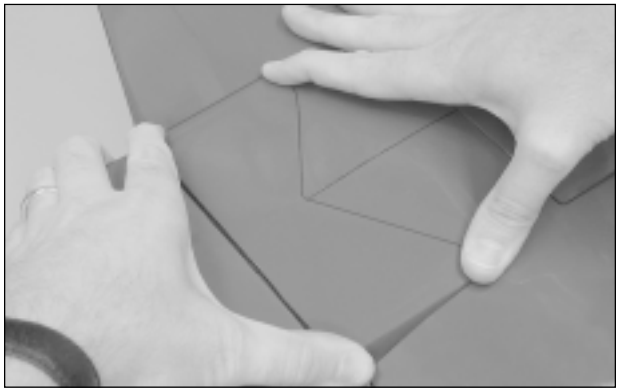
❑ Set the wing back into place and align the holes in the wing with the preinstalled blind nuts in the wing mounting block inside the fuselage.

❑ Secure the wing into place, using two plywood wing-screw doublers, two M5 x 40mm machine screws and two M5 flat washers.

☞ Don't overtighten the screws. You don't want to crush the wing.

◆**IMPORTANT**◆ It's not necessary, but the two plywood wing-screw doublers can be glued to the wing fairing if you prefer.

STEP 3: INSTALLING THE FRONT WING FAIRING



❑ With the wing installed onto the fuselage, position the front wing fairing onto the wing. When lined up properly, the sides and bottom of the wing fairing should be even with the sides and bottom of the fuselage, and there should be few or no gaps between the base of the wing fairing and the wing. The center of the wing fairing (at the back) should line up over the wing centerline, too.

◆**IMPORTANT**◆ There should be a 1/16" gap between the front edge of the wing fairing and the fuselage.

◆**IMPORTANT**◆ If there are gaps between the base of the wing fairing and the wing, use 220 grit sandpaper to sand away some material from the base of the wing fairing. Remove small amounts of material at a time and recheck the fit often, until you are satisfied with the fit.

❑ Mix a generous amount of 5 minute epoxy and apply a thin layer to the gluing surfaces of the wing fairing. Set the wing fairing back into place and realign it. Remove any excess epoxy, using a paper towel and rubbing alcohol, and hold the wing fairing firmly in place, until the epoxy completely sets up.

◆**WARNING**◆ Be careful not to get any epoxy between the wing fairing and the fuselage and/or between the wing and the fuselage. You don't want to accidentally glue the wing to the fuselage.

SECTION 8: STABILIZER INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

- ❑ (1) Horizontal Stabilizer w/Elevator Halves
- ❑ (1) Vertical Stabilizer w/Rudder
- ❑ (1) 2-1/4" Prebent Torque Rod w/Flange Bearing
- ❑ (2) 2-1/2" Prebent Torque Rods w/Flange Bearing

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

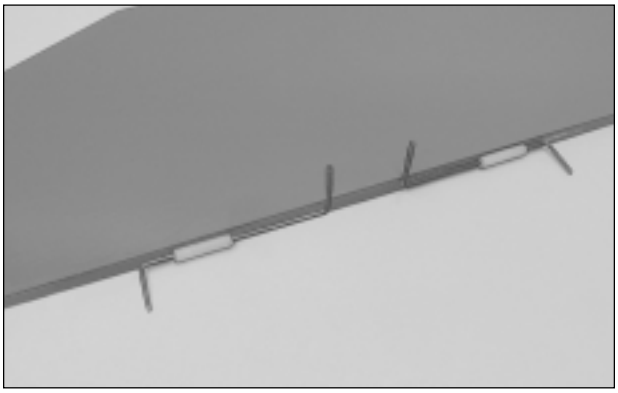
- ❑ Kwik Bond 5 Minute Epoxy
- ❑ Kwik Bond 30 Minute Epoxy
- ❑ Lightweight Oil or Vaseline®
- ❑ Excel Modeling Knife
- ❑ Dubro T-Pins
- ❑ Ernst Airplane Stand
- ❑ Ruler
- ❑ Pencil
- ❑ Builder's Triangle
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Masking Tape
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

✦PLEASE READ BEFORE PROCEEDING✦

It's important that you carefully follow the steps and procedures in this section as they are laid out for you. Doing something out of order may result in you not being able to install the stabilizers correctly.

STEP 1: ALIGNING THE HORIZONTAL STABILIZER

❑ Remove the two elevator halves and four hinges from the horizontal stabilizer and set them aside for now.

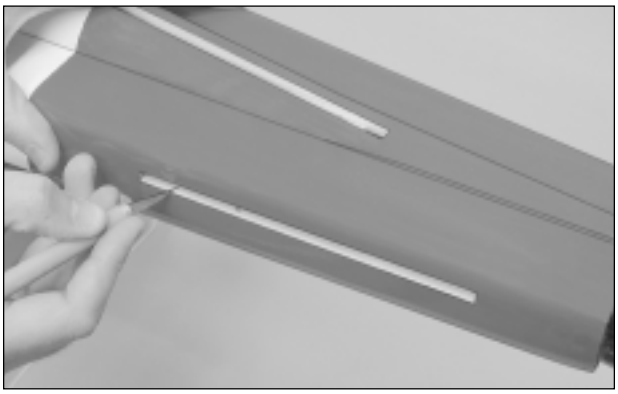


❑ Test-fit the two 2-1/2" long threaded torque rods into the precut slots in the trailing edge of the stabilizer. The center of the nylon bearings should be 7-1/4" from the ends of the stabilizer.

✦IMPORTANT✦ You may need to carefully cut a shallow bevel in the stabilizer directly above and below each nylon bearing. The bevel should be deep enough so that when you push the torque rod into place, the bearing will be slightly recessed into the trailing edge and there won't be any gap between the trailing edge and the torque rod wire.

❑ When satisfied with the fit, remove the two torque rods and set them aside for now.

✦IMPORTANT✦ Do not glue the torque rods into the stabilizer at this time. If you glue them into place now, you won't be able to mount the stabilizer.



❑ Using a modeling knife, cut away and remove the covering material from over the horizontal and vertical stabilizer mounting slots in the back of the fuselage. The horizontal stabilizer mounting slots are 6-1/8" long and 1/4" wide, and the vertical stabilizer mounting slot is 5-3/4" long and 1/4" wide.

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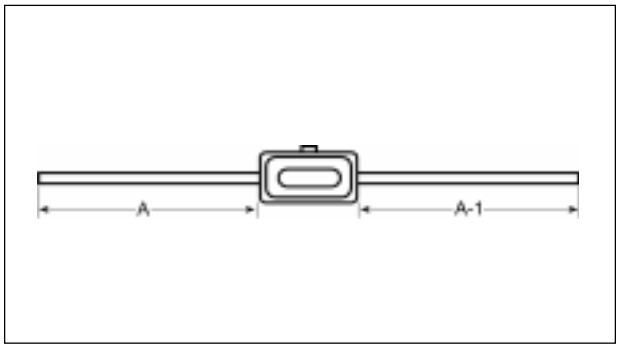
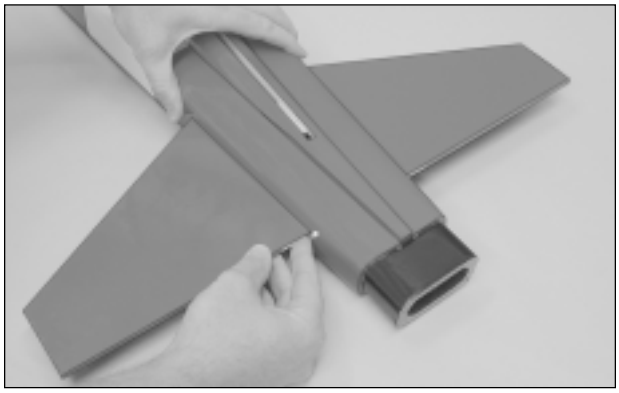


❑ Slide the horizontal stabilizer into the mounting slot and center it by carefully measuring out from each side of the fuselage to each end of the stabilizer (at the trailing edge only for now). When the stabilizer is centered, both measurements will be equal.

☞ The top of the stabilizer is covered red.

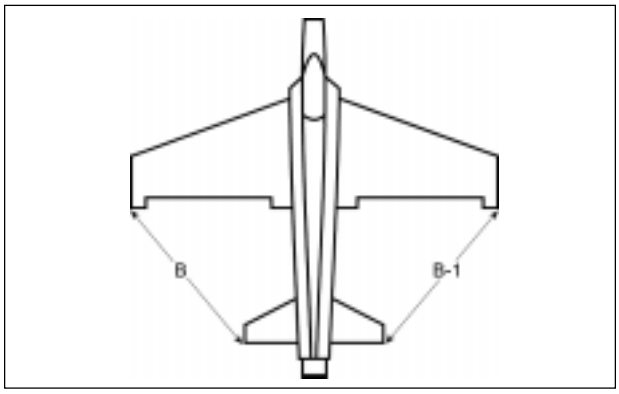
◆IMPORTANT◆ The stabilizer should be pushed forward as far as possible. There will be about a 1/8" wide gap between the trailing edge of the stabilizer and the mounting slot. This gap is for the torque rods to slide through.



❑ When you're satisfied that the stabilizer is centered at the trailing edge, draw a mark on each side of the stabilizer (at the trailing edge) where it meets the fuselage sides.

❑ With the marks on the stabilizer lined up with the fuselage sides, hold **only** the trailing edge of the stabilizer in position using a T-Pin.

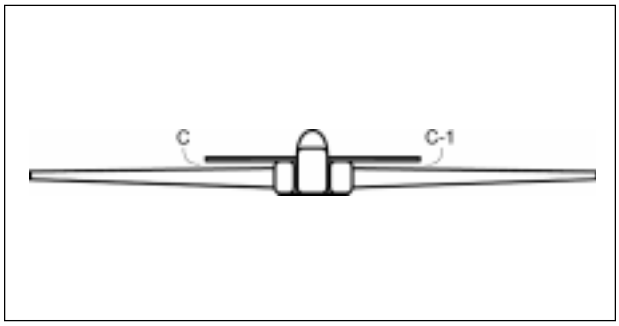
◆IMPORTANT◆ The front of the stabilizer should be able to pivot from side to side and the back should stay firmly in place and aligned. The trailing edge should not be allowed to move from side to side.



❑ With the wing mounted to the fuselage, use a ruler to measure the distance between the tips of the stabilizer and the tips of the wing. Pivot the front of the stabilizer until both of these measurements are equal.

☞ When both of these measurements are equal, you're assured that the stabilizer is square to the wing.

❑ When you are satisfied that the stabilizer is square to the wing, use a pencil to draw a couple of marks on each side of the front of the stabilizer where it and the fuselage sides meet, then use a couple of pieces of masking tape or T-Pins to hold the stabilizer firmly in place and aligned.



❑ With the stabilizer held firmly in place, look from the front of the airplane at both the wing and the stabilizer. When aligned properly, the stabilizer should be parallel to the wing.

☞ If the stabilizer is out of alignment, remove it and use 220 grit sandpaper with a sanding block to sand down the higher side of the stabilizer mounting slot, then reinstall the stabilizer and check the alignment once more. Repeat this procedure until you are satisfied with the alignment.

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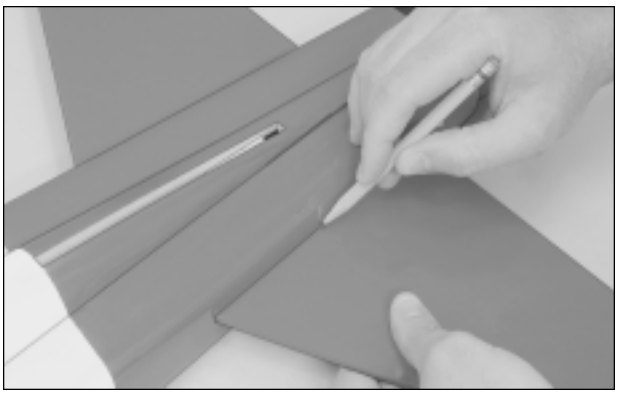
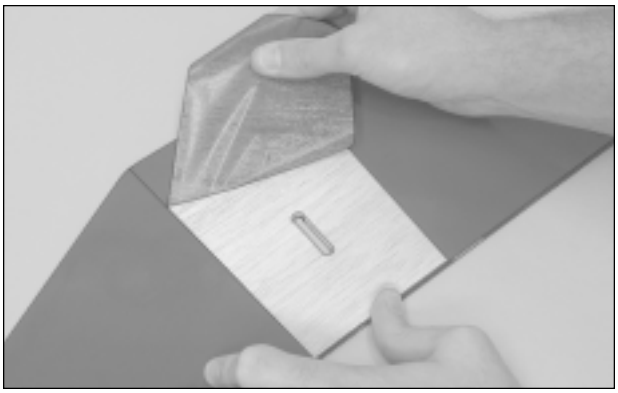


❑ With the stabilizer properly aligned, use a pencil to draw a line on each side of the stabilizer where it meets the fuselage sides. Do this on both the top and the bottom.

STEP 2: MOUNTING THE HORIZONTAL STABILIZER



❑ Remove the stabilizer from the fuselage.

❑ Using a modeling knife, carefully cut away and remove the covering material from between the lines you drew. Do this on both the top and the bottom.

◆**WARNING**◆ When cutting through the covering to remove it, cut with only enough pressure to cut through only the covering itself. Cutting down into the balsa structure could weaken the stabilizer and cause it to fail during flight.

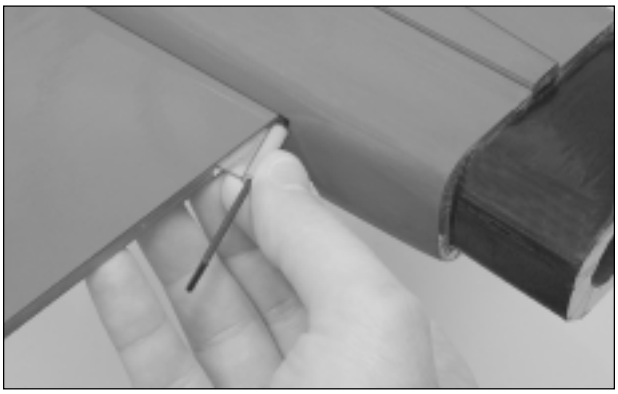
❑ Mix and apply a generous amount of 30 minute epoxy to **ONLY the top and bottom** gluing surfaces of the stabilizer.

◆**IMPORTANT**◆ Because the stabilizer has to slide into place through the fuselage, apply epoxy only to the stabilizer. This will prevent the epoxy from spreading over the entire length of one half of the stabilizer when you slide it into place.

❑ Slide the stabilizer back into place and realign it, double-checking all of your measurements once more before the epoxy sets up. Quickly remove any excess epoxy and use pieces of masking tape or T-Pins to hold the stabilizer in place and aligned until the epoxy has fully cured.

❑ After the epoxy has fully cured, remove the masking tape and look closely at the glue joint. If there are any gaps between the stabilizer and the fuselage, fill them using 30 minute epoxy for added strength. Again, before the epoxy sets up, remove any excess epoxy, using a paper towel and rubbing alcohol.

STEP 3: INSTALLING THE ELEVATOR TORQUE RODS



◆**IMPORTANT**◆ Do not glue the elevator torque rods into place yet. It's important to test-fit them first to ensure they line up correctly.

❑ Notice that there are left and right elevator torque rods. Working on the left side for now, slide the nylon bearing up against the threaded end of the torque rod, then slide the threaded end of the torque rod through the slot behind the stabilizer trailing edge. At the same time, pivot the nylon bearing into the slot in the trailing edge, as shown.

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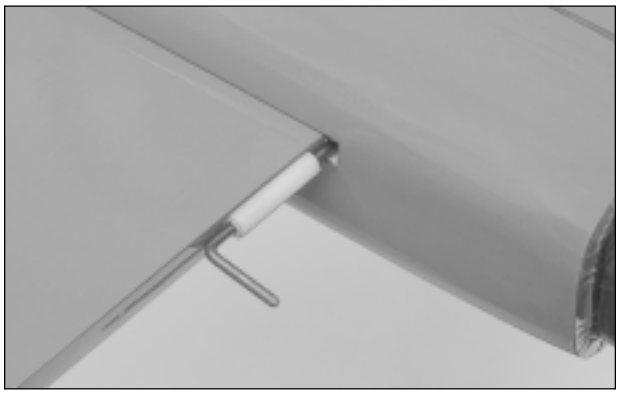
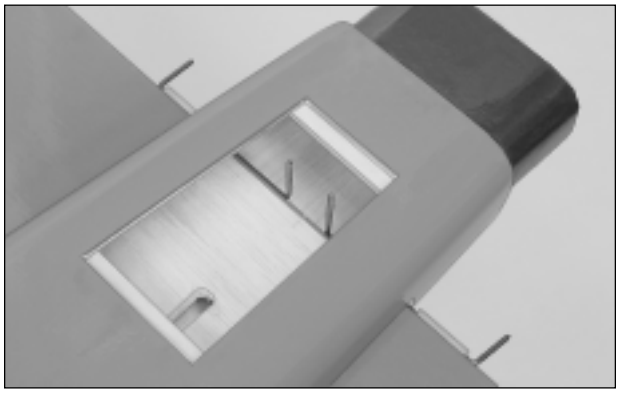


❑ Gently push the nylon bearing into the slot, then slide the torque rod into the fuselage, so that the plain end of the torque rod is near the nylon bearing, as shown.

❑ Test-fit the second elevator torque rod into the right side of the elevator, using the same techniques. Again, don't glue the torque rod into place yet.



❑ Turn the fuselage over and remove the control system hatch cover from the back of the fuselage.

❑ Look inside the hatch. The threaded ends of both torque rods should appear, as shown.

❑ When satisfied with the fit and alignment, carefully remove both torque rods and lightly sand the mounting tab on the nylon bearings, using 220 grit sandpaper.

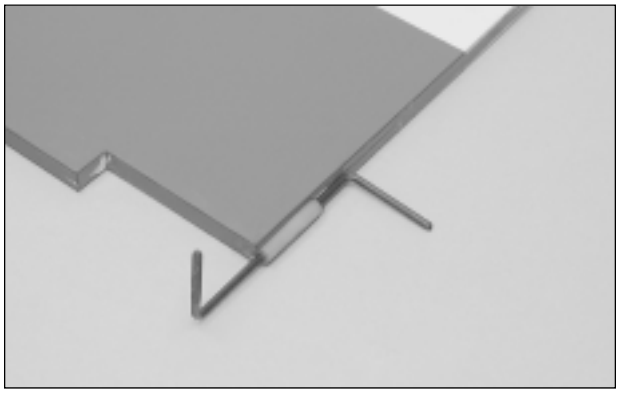
❑ Apply a thin layer of lightweight oil or Vaseline® to only the pivot point of the nylon bearings to prevent epoxy from gluing the bearings to the torque rod wires.

❑ Carefully reinstall the elevator torque rods, using a thin layer of 5 minute epoxy to glue the nylon bearings into the stabilizer. Remove any excess epoxy, using a paper towel and rubbing alcohol, and allow the epoxy to set up.

◆WARNING◆ Be careful not to get any epoxy between the nylon bearings and the torque rod wires. You don't want to glue the torque rod wires solid. They must be able to pivot smoothly.

STEP 4: ALIGNING THE VERTICAL STABILIZER

❑ Remove the rudder and the three hinges from the vertical stabilizer and set them aside for now.



❑ Test-fit the 2-1/4" long threaded torque rod into the precut slot in the trailing edge of the stabilizer. The center of the nylon bearing should be 1/2" up from the bottom of the stabilizer.

◆IMPORTANT◆ You may need to carefully cut a shallow bevel in the stabilizer directly to the right and left of the nylon bearing. The bevel should be deep enough so that when you push the torque rod into place, the bearing will be slightly recessed into the trailing edge and there won't be any gap between the trailing edge and the torque rod wire.

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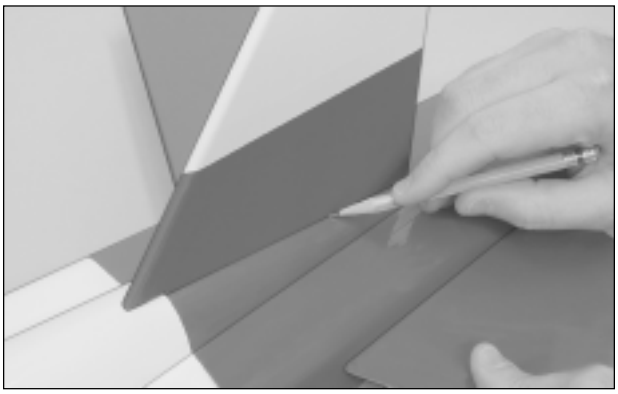
❑ When satisfied with the fit, remove the torque rod from the stabilizer and set it aside for now.

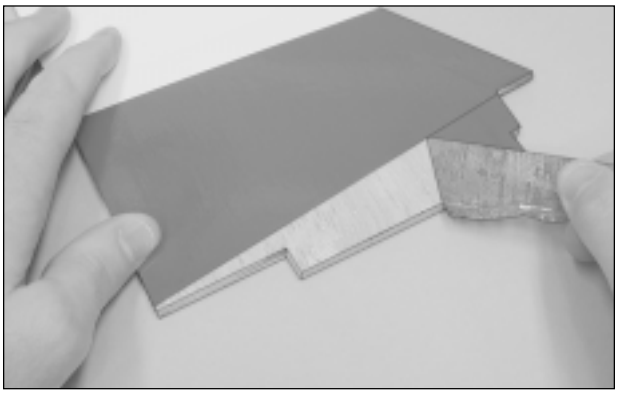
◆IMPORTANT◆ Do not glue the torque rod into the stabilizer at this time. If you glue it into place now, you won't be able to mount the stabilizer.



❑ Push the vertical stabilizer down into its mounting slot. To align it properly, it should be pushed down firmly and there should be about a 1/8" wide gap between the trailing edge and the back of the mounting slot. The vertical stabilizer should be perpendicular to the horizontal stabilizer, too.

❑ While holding the vertical stabilizer firmly in place, use a pencil to draw a line on each side of the vertical stabilizer where it meets the top of the fuselage.

STEP 5: MOUNTING THE VERTICAL STABILIZER



❑ Remove the vertical stabilizer and use a modeling knife to carefully cut away and remove the covering material from below the lines you drew.

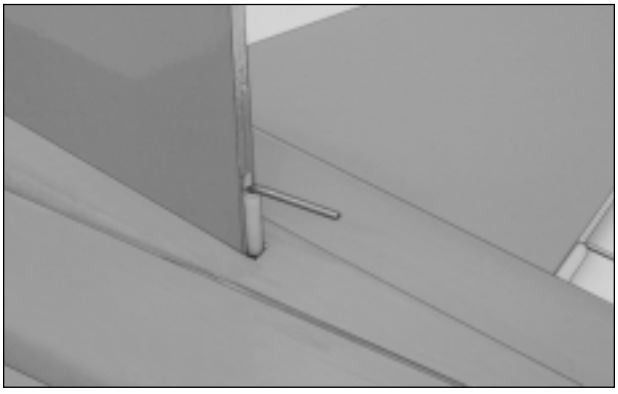
◆WARNING◆ When cutting through the covering to remove it, cut with only enough pressure to cut through only the covering itself. Cutting down into the balsa structure could weaken the stabilizer and cause it to fail during flight.

❑ Mix and apply a generous amount of 30 minute epoxy to the gluing surfaces of both the vertical stabilizer and the vertical stabilizer mounting slot in the top of the fuselage.

❑ Push the vertical stabilizer down into place and realign it, double-checking all of your measurements once more before the epoxy sets up. Quickly remove the excess epoxy and use pieces of masking tape to hold the vertical stabilizer in place until the epoxy has fully cured.

☞ Don't forget to double-check that the vertical stabilizer is perpendicular to the horizontal stabilizer.

STEP 6: INSTALLING THE RUDDER TORQUE ROD



❑ Install the rudder torque rod into the vertical stabilizer, using the same techniques as when you installed the elevator torque rods into the horizontal stabilizer.

◆IMPORTANT◆ The threaded portion of the torque rod fits down through the precut slot in the horizontal stabilizer and into the control system hatch. Double-check that the torque rod does not bind against the precut slot.

SECTION 9: CONTROL SURFACE HINGING

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

- ❑ (3) Nylon Adjustable Control Horns (Small Thread)
- ❑ (13) C/A Style Hinges

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond Thin C/A
- ❑ Kwik Bond 5 Minute Epoxy
- ❑ Kwik Bond C/A Debonder
- ❑ Lightweight Oil or Vaseline®
- ❑ Excel Modeling Knife
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Waxed Paper
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

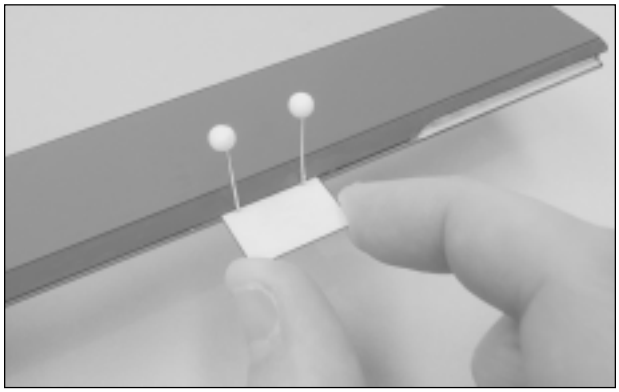
✦WARNING✦ For flutter-free control surfaces, it is imperative that the hinges be glued in properly. This is achieved by having a tight hinge gap and using plenty of thin C/A glue. Poor hinge installation can lead to control surface flutter which can result in a catastrophic failure of the airframe. It's important to use a generous amount of epoxy to glue the torque rods into the control surfaces, too. This will result in more positive control.

STEP 1: HINGING THE AILERONS

❑ Using a modeling knife, carefully cut away and remove the covering material from over the precut slot in the root end of one aileron.

☞ Notice that there is a predrilled hole in the slot to accept the aileron torque rod wire.

❑ Push two T-pins through the center of three C/A style aileron hinges. The T-pins will keep the hinges centered while you are hinging the aileron.



❑ Slide one hinge into each hinge slot in the aileron, making sure that you push each hinge in up to the T-pins. **Don't glue the hinges into place yet.**

❑ Push the aileron and its hinges into the hinge slots in the trailing edge of the wing, making sure that the torque rod wire is firmly seated within the slot in the aileron. The aileron should be pushed firmly up against the trailing edge, so that there is a minimal hinge gap (no more than 1/32" wide), and the ends of the aileron should not rub against the wing.

✦IMPORTANT✦ You may need to cut the slot in the aileron for the torque rod wire deeper so that the aileron can be pushed forward enough to result in no more than a 1/32" wide hinge gap.

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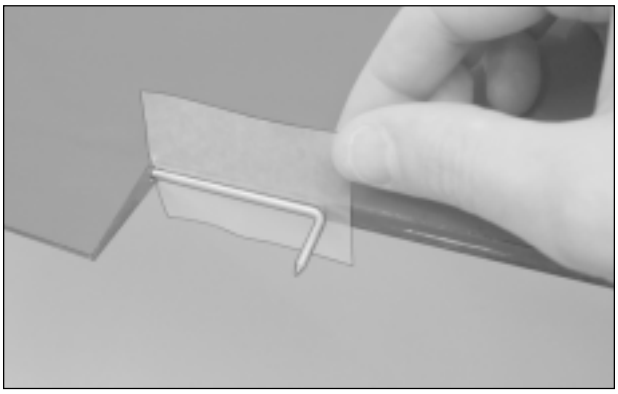
❑ When satisfied with the fit, remove the aileron from the wing, but leave the hinges in the aileron.



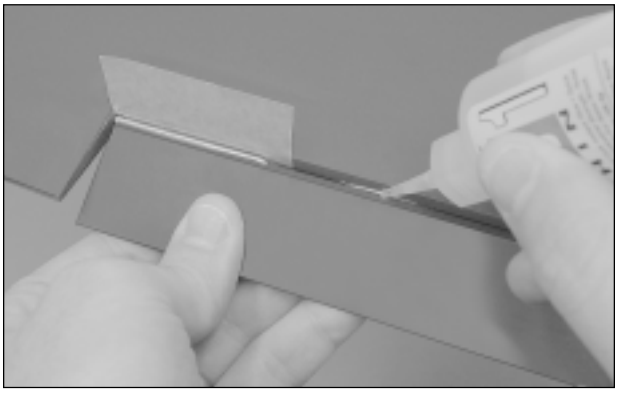
❑ Cut out a 1-1/2" square piece of waxed paper.

❑ Slide the waxed paper between the torque rod wire and the trailing edge of the wing.

☞ The waxed paper will prevent epoxy from gluing the torque rod to the trailing edge.

❑ Using 220 grit sandpaper, lightly sand the end of the torque rod wire to roughen the surface, then mix a small quantity of 5 minute epoxy and apply a thin layer to the end of the aileron torque rod wire and into the predrilled hole and the precut slot in the leading edge of the aileron.

❑ Push the aileron and its hinges into the hinge slots in the trailing edge of the wing and align the aileron as done previously.



❑ Remove the T-pins from the hinges, and while holding the aileron tight against the wing, pivot the aileron down about 45° and apply 5-6 drops of thin C/A to the exposed area of each hinge. Turn the wing over and repeat for the other side of the hinges.

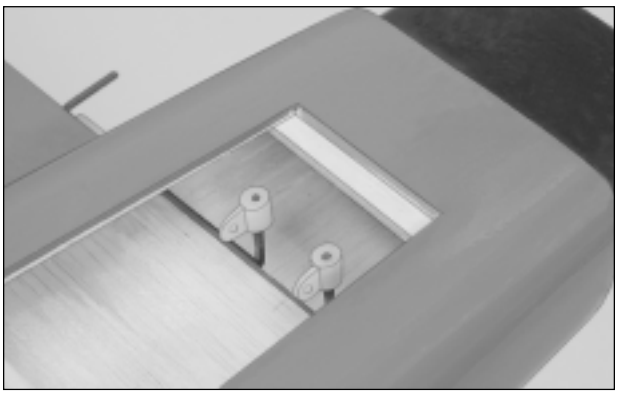
☞ Remove any C/A that may run down the hinge line, using C/A Debonder.

❑ Allow the C/A and epoxy to dry for about 15 minutes, then pivot the aileron up and down several times to free up the hinges.

PRO TIP After the C/A and epoxy have fully cured, gently grasp the aileron and wing and pull on the aileron like you are trying to pull out the hinges. The hinges should hold securely. If one or more hinges feels loose, apply more C/A to the hinge(s) and allow it to completely cure.

❑ Repeat the previous procedures to hinge the second aileron to the wing, making sure to check the integrity of the hinges after the C/A and epoxy fully cure.

STEP 2: HINGING THE ELEVATOR HALVES



❑ Carefully thread one nylon adjustable control horn onto each threaded elevator torque rod wire. The control horns should both face the front of the fuselage and they should both be flush with the top of the torque rod wires, too.

☞ It's much easier to thread the control horns into place now, rather than waiting until after you've hinged the elevator halves.

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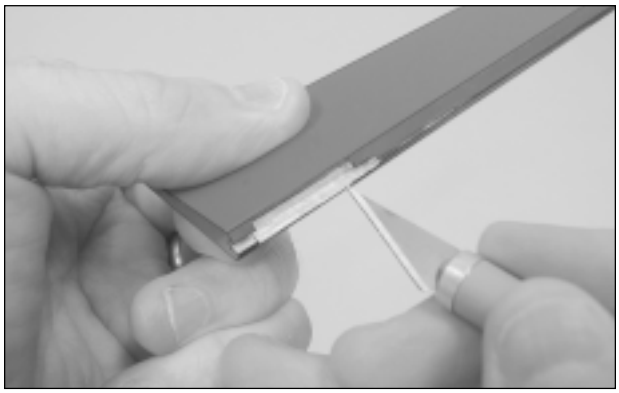
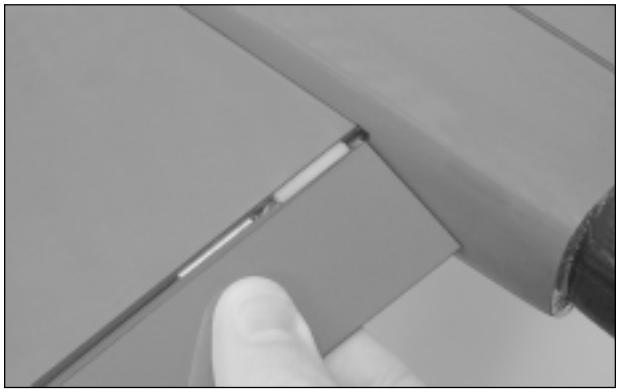


❑ Using a modeling knife, carefully cut away and remove the covering material from over the precut slot in the root end of one elevator half.

☞ Notice that there is a predrilled hole in the slot to accept the elevator torque rod wire.

❑ Push two T-pins through the center of two C/A style elevator hinges. The T-pins will keep the hinges centered while you are hinging the elevator half.

❑ Slide one hinge into each hinge slot in the elevator half, making sure that you push each hinge in up to the T-pins. **Don't glue the hinges into place yet.**



❑ Push the elevator half and its hinges into the hinge slots in the stabilizer, making sure that the torque rod wire is firmly seated within the slot in the elevator half. The elevator half should be pushed firmly up against the trailing edge, so that there is a minimal hinge gap (no more than 1/32" wide). The tip of the elevator half should be even with the tip of the stabilizer and there should be about a 1/16" wide gap between the elevator half and the fuselage side.

◆IMPORTANT◆ You may need to carefully cut a shallow bevel in the elevator half directly above and below the location where the elevator half and the nylon torque rod bearing meet. The bevel should be deep enough so that when you hinge the elevator half to the stabilizer there won't be more than a 1/32" wide hinge gap.

❑ Remove the elevator half from the stabilizer, but leave the hinges in the elevator half for now. Using 220 grit sandpaper, lightly sand the end of the torque rod wire to roughen the surface, then mix a small quantity of 5 minute epoxy and apply a thin layer to ONLY the end of the torque rod wire and into the predrilled hole in the leading edge of the elevator half.

◆WARNING◆ Do not get epoxy between the elevator half and the nylon torque rod bearing. You don't want to glue the elevator half to the nylon bearing or the elevator half won't pivot up and down.

❑ Push the elevator half and its hinges into the hinge slots in the stabilizer and align the elevator half as done previously.

❑ Remove the T-pins from the hinges, and while holding the elevator half tight against the stabilizer, pivot the elevator half down about 45º and apply 5-6 drops of thin C/A to the exposed area of each hinge. Turn the fuselage over and repeat for the other side of the hinges.

☞ Remove any C/A that may run down the hinge line, using C/A Debonder.

❑ Allow the C/A and epoxy to dry for about 15 minutes, then pivot the elevator half up and down several times to free up the hinges.

PRO TIP After the C/A and epoxy have fully cured, gently grasp the elevator half and stabilizer and pull on the elevator half like you are trying to pull out the hinges. The hinges should hold securely. If one or more hinges feels loose, apply more C/A to the hinge(s) and allow it to completely cure.

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❑ Repeat the previous procedures to hinge the second elevator half to the stabilizer, making sure to check the integrity of the hinges after the C/A and epoxy fully cure.

STEP 3: HINGING THE RUDDER

❑ Hinge the rudder using the same techniques that you used to hinge the elevator halves. Again, to make it easier to install, thread the nylon adjustable control horn onto the threaded rudder torque rod wire before hinging the rudder. The rudder is hinged using three hinges. When hinged, there should be a 1/16" wide gap between the top of the rudder and the vertical stabilizer. The bottom of the rudder should not touch the top of the fuselage, either. After the C/A and epoxy have cured, make sure to test the integrity of the hinges by gently pulling on the rudder.

SECTION 10: LANDING GEAR INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

- ❑ (1) Prebent Steel Nose Gear Strut
- ❑ (2) Prebent Steel Main Landing Gear Wires
- ❑ (1) Nose Gear Wheel
- ❑ (2) Main Gear Wheels
- ❑ (1) Nylon Steering Arm
- ❑ (4) Nylon Landing Gear Straps
- ❑ (4) Nylon Spacers
- ❑ (4) Wheel Collars
- ❑ (5) M3 x 5mm Machine Screws
- ❑ (8) M3 x 12mm Wood Screws
- ❑ (1) 29" Pushrod Wire w/Z-Bend

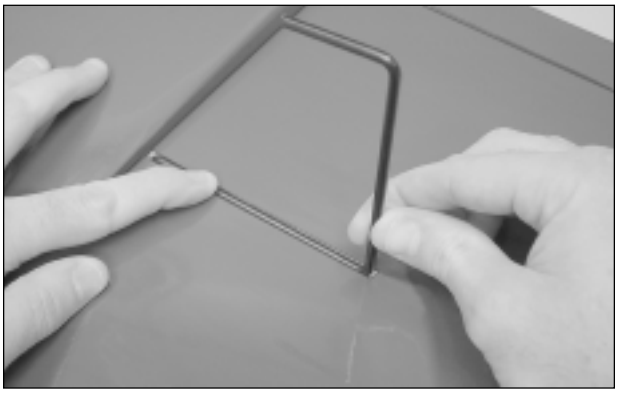
YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond Thick C/A
- ❑ Pacer Z-42 Blue Threadlocker
- ❑ # 2 Phillips Head Screwdriver
- ❑ Excel Modeling Knife
- ❑ Electric Drill
- ❑ 5/64" Drill Bit
- ❑ Ruler
- ❑ 220 Grit Sandpaper w/Sanding Block

STEP 1: INSTALLING THE MAIN LANDING GEAR WIRES

❑ Using a modeling knife, cut away and remove the covering material from over the two precut landing gear mounting slots in the bottom of the wing. Each slot is 4-1/8" long and 1/8" wide.

☞ The slots are located 7-3/8" in front of the trailing edge. If you look carefully, you should be able to see them underneath the covering material.



❑ Insert the 90º bend in each of the main gear wires into the predrilled hole in each landing gear mounting slot.

❑ Push the landing gear wires firmly down into the slots.

☞ The top of the wires should be nearly flush with the surface of the wing.

◆**IMPORTANT**◆ The landing gear axles should point toward the middle of the wing.

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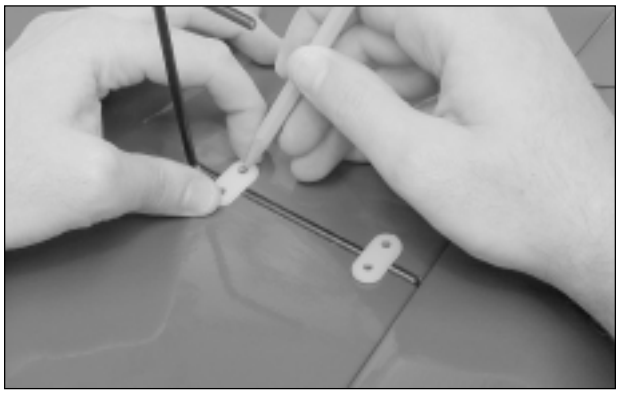
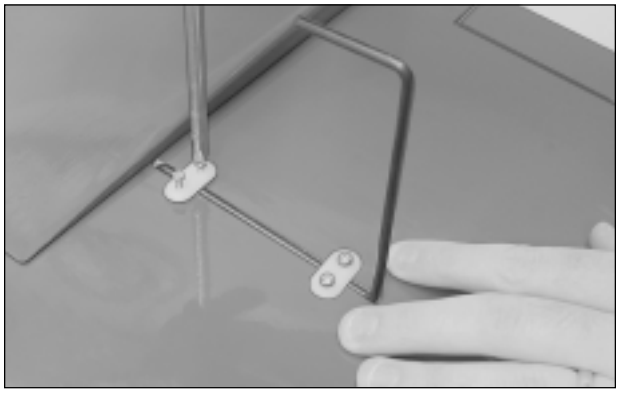


❑ Working with one landing gear wire for now, position two nylon straps over the landing gear wire, equal distances from each end of the wire.

❑ While holding the nylon straps in place, use a pencil to mark the locations of the mounting screws onto the wing.

✦IMPORTANT✦ Make sure that the nylon landing gear straps are centered over the landing gear wire when you mark the positions of the mounting screw holes.

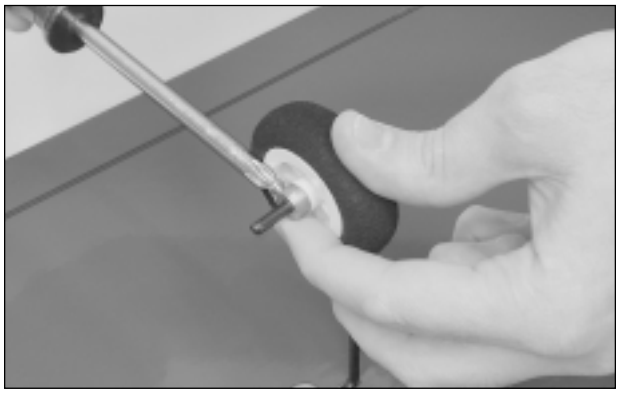


❑ Remove the nylon landing gear straps and drill four 5/64" diameter pilot holes into the wing, being careful not to drill through the top of the wing.

❑ Carefully install the nylon landing gear straps, using four M3 x 12mm wood screws.

❑ Repeat the previous procedures to install the second landing gear wire into the wing.

STEP 2: INSTALLING THE MAIN GEAR WHEELS



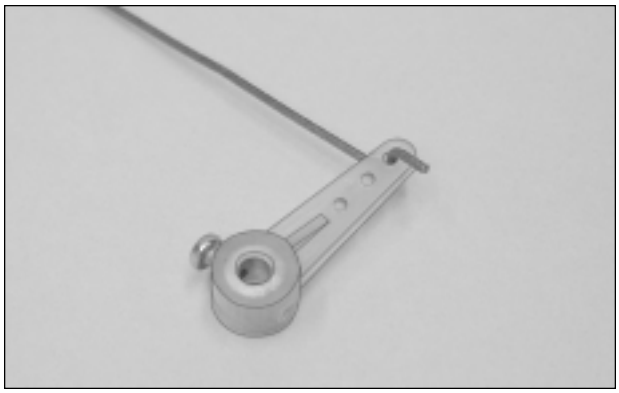
❑ Slide one nylon spacer onto each axle, followed by one main gear wheel. The recessed side of the wheel should be toward the nylon spacer.

❑ Secure each wheel into place, using one wheel collar and one M3 x 5mm machine screw, double-checking that the wheels spin without binding.

✦IMPORTANT✦ We suggest applying a drop of Blue Threadlocker to the machine screws before installing them, to prevent them from loosening during use.

STEP 3: INSTALLING THE NOSE GEAR ASSEMBLY

❑ Partially thread one M3 x 5mm machine screw into the nylon steering arm.



❑ Insert the Z-Bend in the end of the 29" long pushrod wire into the **outermost hole** in the nylon steering arm.

✦IMPORTANT✦ When installing the Z-Bend, make sure that the longer portion of the wire is toward the **bottom** of the steering arm, as shown. It's important that your nylon steering arm/pushrod assembly is orientated as shown in the photo.

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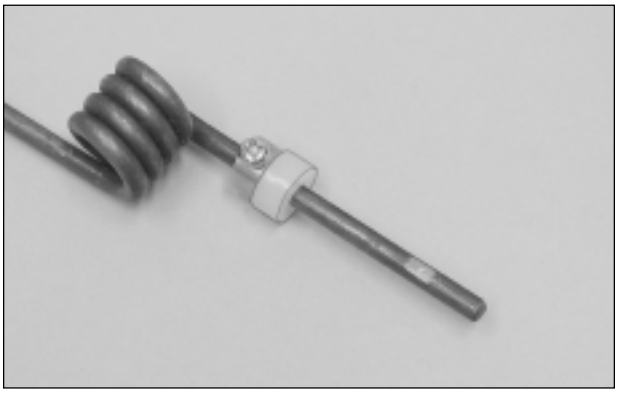
❑ Using a modeling knife, cut away and remove the covering material from over the precut nose gear clearance hole in the bottom of the fuselage. The hole is located 5-1/2" behind the firewall and is 3/4" in diameter.

❑ Remove the fuel tank hatch cover from the fuselage and set it aside.

◆IMPORTANT◆ Before continuing, notice that there are two precut flat spots on the nose gear wire that the machine screws in the nylon steering arm and one wheel collar tighten against.



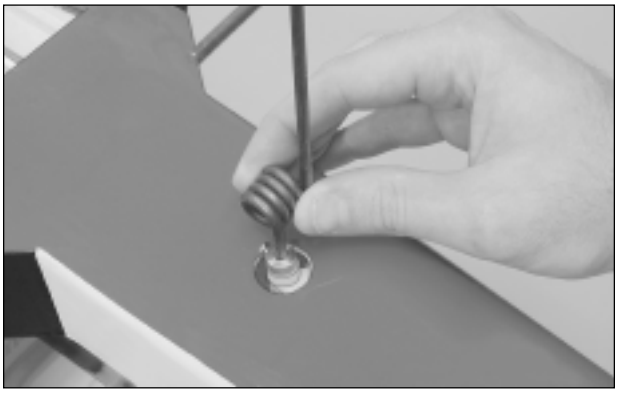
❑ Slide one wheel collar onto the nose gear wire and line it up with the flat spot that is nearest the coil. Install and tighten the M3 x 5mm machine screw to hold the wheel collar in place.

◆IMPORTANT◆ We suggest applying a drop of Blue Threadlocker to the machine screw before installing it, to prevent it from loosening during use.

❑ Slide one nylon spacer onto the nose gear wire and push it against the wheel collar.

❑ Slide the plain end of the steering pushrod wire into the nylon tube (inside the fuel tank hatch) and line up the nylon steering arm with the preinstalled nylon nose gear mounting bracket.

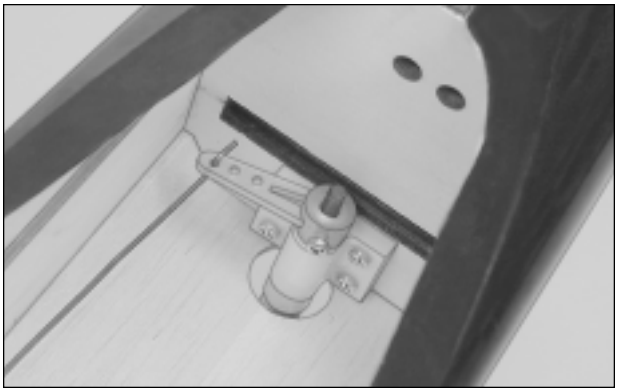
◆IMPORTANT◆ When positioned properly, the machine screw in the nylon steering arm should be toward the back of the fuselage and the longer portion of the pushrod wire should be toward the bottom of the fuselage.



❑ Carefully push the nose gear wire into the nylon nose gear mounting block.

❑ Adjust the nose gear wire so that the coil points toward the back of the fuselage.

❑ Hold the nose gear wire in position and turn the fuselage over. While holding the nose gear wire firmly up against the nylon mounting block, carefully slide the nylon steering arm assembly over the end of the nose gear wire.



❑ With the nose gear lined up straight ahead, push the nylon steering arm down firmly against the top of the nylon mounting block. While still holding the nose gear wire firmly against the bottom of the nylon mounting block, position the nylon steering arm so that it's pointing directly toward the fuselage side. Tighten the M3 x 5mm machine screw firmly.

◆IMPORTANT◆ We suggest applying a drop of Blue Threadlocker to the machine screw, to prevent it from loosening during use.

❑ Rotate the nose gear assembly back and forth several times to check for free movement. When you rotate the nose gear to the right, the nylon steering arm should not hit the top or bottom of the precut slot in the plywood bulkhead.

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STEP 4: INSTALLING THE NOSE GEAR WHEEL

❑ Install the nose gear wheel, using the same techniques you used to install the main gear wheels.

☞ Make sure that the recessed side of the wheel is toward the nylon spacer.

SECTION 11: ENGINE INSTALLATION

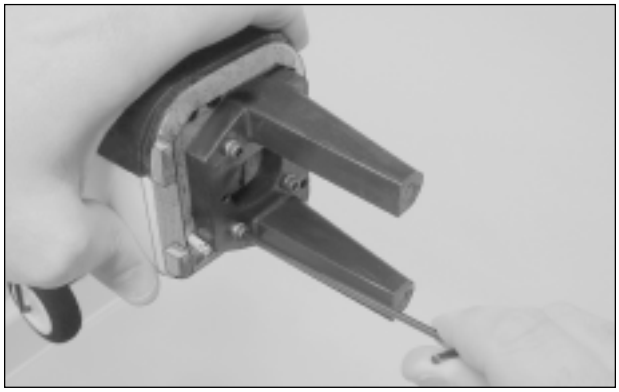
YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

- ❑ (1) Engine Mount
- ❑ (4) M3 x 18mm Socket-Cap Screws
- ❑ (4) M3 x 30mm Socket-Cap Screws
- ❑ (4) M3 Lock Nuts
- ❑ (12) M3 Flat Washers

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Pacer Z-42 Blue Threadlocker
- ❑ 2.5mm Hex Wrench
- ❑ Adjustable Open-End Wrench
- ❑ Electric Drill
- ❑ 5/64" & 1/8" Drill Bits
- ❑ Ernst Airplane Stand
- ❑ Ruler
- ❑ Pencil

STEP 1: INSTALLING THE ENGINE MOUNT



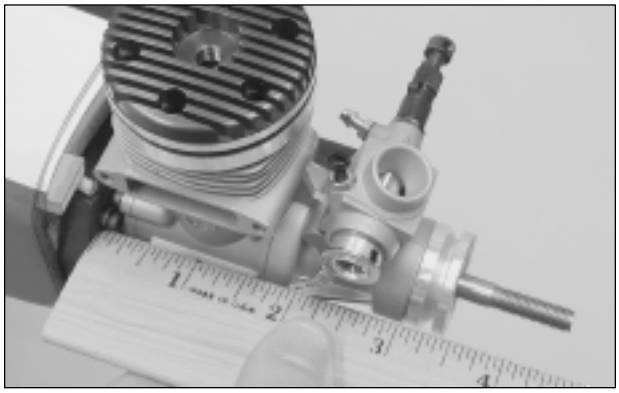
❑ Install the engine mount onto the firewall, using four M3 x 18mm socket-cap screws and four M3 flat washers. Tighten the screws firmly to hold the engine mount securely in place.

☞ Blind nuts have been preinstalled into the back of the firewall to thread the screws into. We suggest applying Blue Threadlocker to the screws to secure them into place.

◆IMPORTANT◆ The engine mount is orientated sideways and can only fit one way.

STEP 2: ALIGNING AND INSTALLING THE ENGINE

◆IMPORTANT◆ Depending on the engine you've chosen to use, the engine's crankcase might be too wide to fit inside the engine mount. If this is the case, carefully widen the space between the engine mounting beams, using 220 grit sandpaper, until your engine fits properly.



❑ Set the engine onto the engine mounting beams.

❑ Using a ruler, measure the distance from the front of the engine mount to the front of your engine's drive washer. Adjust the depth of the engine so that the measurement is 3-3/8".

◆IMPORTANT◆ It's important that the front of the drive washer be 3-3/8" from the front of the engine mount so that the cowling will line up properly when it's installed later.

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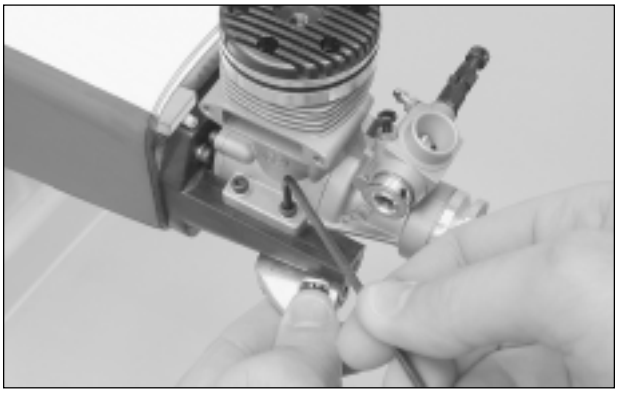
❑ Using a pencil, carefully mark the locations of the engine mounting holes onto the engine mount.

❑ Remove the engine and drill 5/64" diameter pilot holes through the engine mount, at the marks you drew.

◆IMPORTANT◆ Be careful that you drill the holes straight down and not at an angle.

❑ Carefully enlarge the 5/64" diameter pilot holes, using a 1/8" diameter drill bit.



❑ Install the engine using four M3 x 30mm socket-cap screws, eight M3 flat washers and four M3 lock nuts.

☞ Tighten the screws and nuts firmly to hold the engine securely into place. You don't need to use Blue Threadlocker on the engine mounting screws since we're using lock nuts.

SECTION 12: FUEL TANK ASSEMBLY & INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

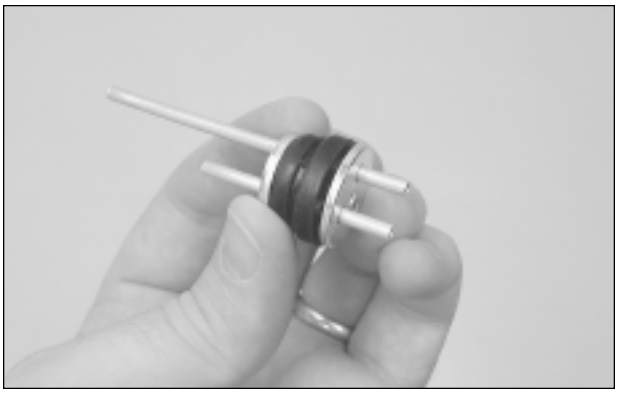
- ❑ (1) 320cc Fuel Tank
- ❑ (1) Large Diameter Metal Plate
- ❑ (1) Small Diameter Metal Plate
- ❑ (1) Metal Neck-Reinforcement Ring
- ❑ (1) Rubber Stopper
- ❑ (1) Fuel Pick-Up "Clunk"
- ❑ (1) M3 x 20mm Machine Screw
- ❑ (1) Silicon Fuel Tubing
- ❑ (2) Aluminum Tubing

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ # 2 Phillips Head Screwdriver
- ❑ Excel Modeling Knife
- ❑ Scissors
- ❑ Ernst Airplane Stand
- ❑ Ruler
- ❑ 220 Grit Sandpaper w/Sanding Block

STEP 1: ASSEMBLING THE RUBBER STOPPER

❑ Using 220 grit sandpaper, carefully smooth and deburr each end of the two aluminum tubes. This will prevent the fuel tubing from being accidentally cut when it is installed later.



❑ Push the two aluminum tubes through the rubber stopper. Slide the large diameter metal plate over the tubes at the front of the stopper and slide the small diameter metal plate over the tubes at the rear of the stopper.

❑ Using a ruler, measure the distance that the two aluminum tubes protrude from the front of the stopper assembly. This distance should be 3/8". If it is not, adjust the tubes by pushing them forward or backward until you are satisfied with the alignment.

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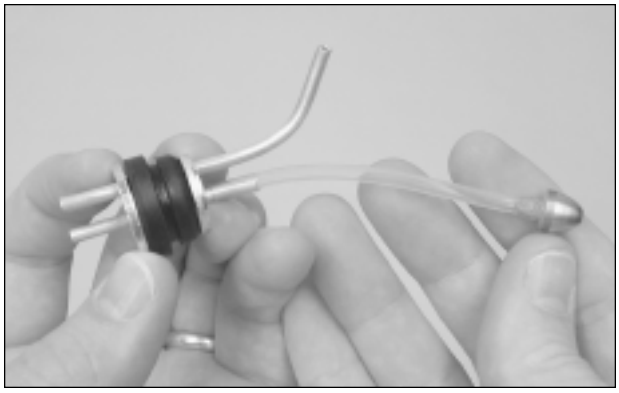
❑ Carefully bend the longer of the two aluminum tubes up at a 45º angle, being careful not to "kink" the tubing as you bend it.

◆IMPORTANT◆ When the stopper assembly is installed in the fuel tank, the top of the vent tube (the tube you just bent) should rest just inside the bubble in the top of the tank.



❑ Secure one end of the silicon fuel tubing onto the end of the fuel pick-up "clunk."

❑ Slide the silicon fuel tubing, with the fuel pick-up attached, onto the end of the aluminum fuel pick-up tube (straight tube). While holding the aluminum tube in place, adjust the length of the silicon tubing until the fuel pick-up is 4-3/8" back from the rear of the stopper assembly.

❑ Push the M3 x 20mm machine screw through the stopper assembly, from the front, and partially thread it into the small diameter metal backplate.

STEP 2: INSTALLING THE RUBBER STOPPER ASSEMBLY

❑ Carefully push the metal neck-reinforcement ring over the neck of the molded fuel tank opening.

❑ Carefully push the rubber stopper assembly into the fuel tank opening and rotate the stopper assembly until the aluminum vent tube rests just inside the bubble in the top of the tank.

PRO TIP If you have trouble seeing the vent tube, hold the fuel tank assembly up to a bright light. This will illuminate the inside of the tank.

❑ When satisfied with the alignment, tighten the machine screw until the rubber stopper expands and seals the fuel tank opening.

◆IMPORTANT◆ Don't overtighten the machine screw or you might strip the threads in the small metal plate.

❑ With the rubber stopper assembly installed, double-check to make sure that the fuel pick-up can move freely inside the fuel tank. Ideally, the fuel pick-up should be about 1/4" in front of the back of the fuel tank.

STEP 3: INSTALLING THE FUEL TANK

❑ Cut two pieces of silicon fuel tubing to a length of 12".

❑ Feed the ends of the fuel tubing into the predrilled holes in the firewall and through the predrilled holes in the forward bulkhead.

PRO TIP To make this task easy, use a small diameter stick, or even better, the threaded rudder pushrod wire, to use as a guide to feed the fuel tubing through the holes.

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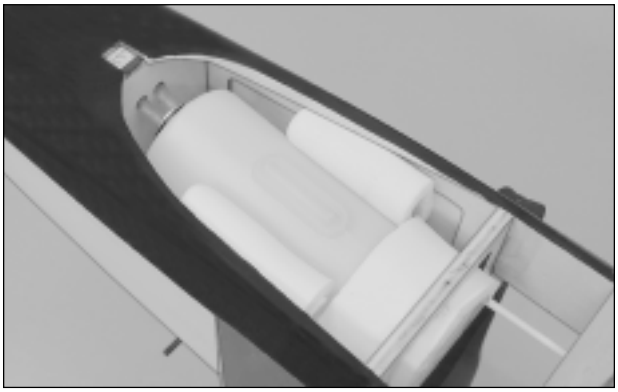
❑ Slide the fuel tank into the fuel tank compartment, making sure that the bubble in the top of the fuel tank is toward the top of the fuselage, then install the silicon fuel tubing to the aluminum tubes at the front of the tank.

PRO TIP Mark the ends of the silicon tubing "vent" and "pick-up" so you don't confuse them when it comes time to connect them to the engine later on.



❑ To align the fuel tank properly, the back of the fuel tank should be even with, or only slightly behind, the back edge of the wing-mount bulkhead and the front of the fuel tank should closely line up with the predrilled holes in the forward bulkhead, so that the fuel tubing does not kink.

❑ To secure the fuel tank assembly into place, cut and install pieces of foam rubber between the top and sides of the fuel tank and the wing-mount bulkhead, and between the sides of the fuel tank and the fuselage sides.

◆IMPORTANT◆ Make sure that the foam rubber does not interfere with the steering pushrod wire and that the fuel tubing is not kinked between the fuel tank and the forward bulkhead.

SECTION 13: THROTTLE CONTROL SYSTEM INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

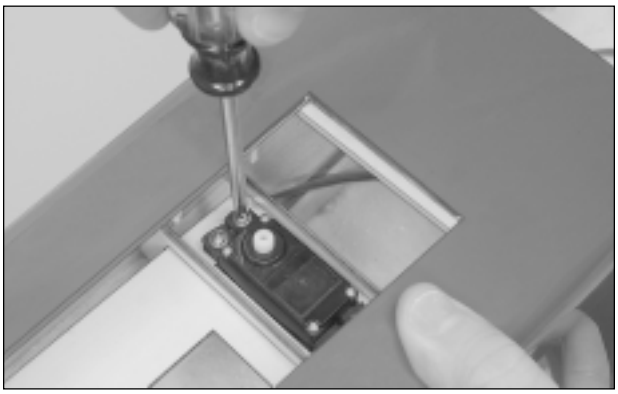
- ❑ (1) 34" Pushrod Wire w/Z-Bend
- ❑ (1) Adjustable Servo Connector Assembly

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond Thin C/A
- ❑ # 1 Phillips Head Screwdriver
- ❑ 1.5mm Hex Wrench
- ❑ Wire Cutters
- ❑ Needle Nose Pliers
- ❑ Excel Modeling Knife
- ❑ Electric Drill
- ❑ 1/16" & 5/64" Drill Bits
- ❑ Ernst Airplane Stand
- ❑ Ruler

STEP 1: INSTALLING THE THROTTLE SERVO

❑ Install the rubber grommets and brass collets onto your throttle servo, making sure to install the collets with the flanges toward the bottom of the servo.



❑ Install the throttle servo into the forward most cutout in the plywood servo tray, making sure to first drill 1/16" diameter pilot holes for the mounting screws.

◆IMPORTANT◆ The servo output shaft should be toward the right side of the fuselage, as shown.

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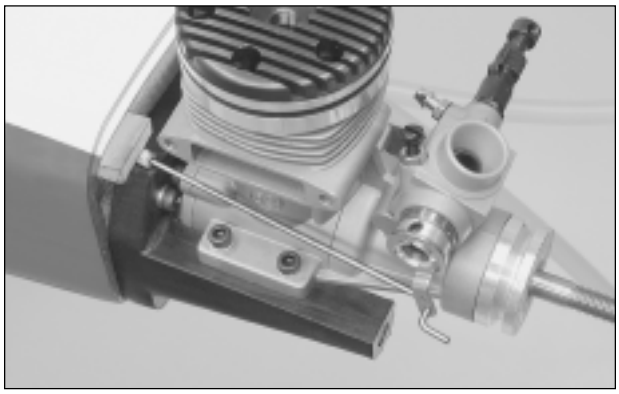
STEP 2: INSTALLING THE THROTTLE PUSHROD WIRE & ADJUSTABLE CONNECTOR

❑ Remove the throttle arm from your engine and install the Z-Bend in the pushrod wire into the outermost hole in the throttle arm.

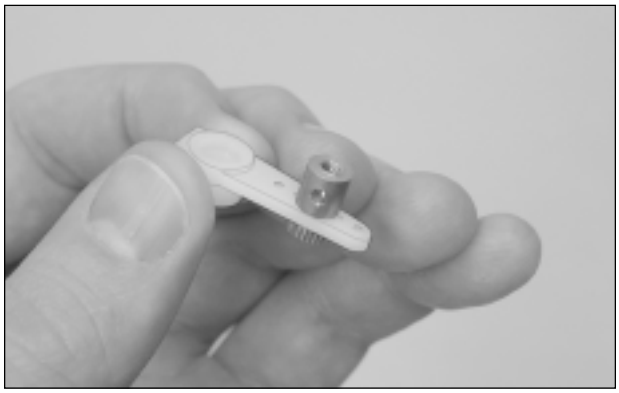
☞ You may need to enlarge the hole in your engine's throttle arm, using a 5/64" diameter drill bit, to accommodate the wire.



❑ Slide the plain end of the throttle pushrod wire into the nylon tube in the firewall, then reinstall the throttle arm onto your engine.

✦IMPORTANT✦ So that the pushrod wire doesn't bind, you may need to make a bend in the pushrod wire so that it lines up better with your engine's throttle arm. It may help to have the longer portion of the pushrod wire toward the inside of the throttle arm, too.

❑ Using a modeling knife, cut away all but one arm from a "4-point" servo horn.



❑ Enlarge the hole in the servo arm that is 9/16" out from the center of the servo arm, using a 5/64" diameter drill bit.

❑ Install the adjustable servo connector into the enlarged hole.

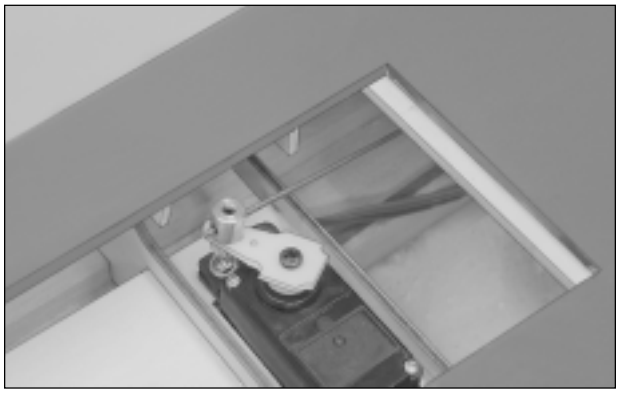
✦IMPORTANT✦ When threading on the connector nut, don't tighten the nut completely. You don't want the connector loose, but you do want it to be able to rotate without binding.

PRO TIP To prevent the connector nut from loosening during flight, apply a drop of thin C/A to it. Allow the C/A to dry before proceeding.

❑ Connect your radio system and plug the throttle servo into the receiver. Check to ensure that the throttle servo output shaft is rotating in the correct direction. When the throttle control stick is moved forward, from the idle to the full throttle position, the servo output shaft should rotate clockwise. If it doesn't, flip the servo reversing switch on your transmitter.

❑ Position the throttle control stick and the throttle trim lever on your transmitter to their lowest positions.

❑ Slide the adjustable servo connector/servo horn assembly over the plain end of the throttle pushrod wire.



❑ After making sure that the carburetor is in the fully closed position, angle the servo horn back about 45º from center and attach it to the servo output shaft. The servo connector should be facing the side of the fuselage, as shown.

☞ You may need to make a shallow bend in the pushrod wire near the servo arm, so that the pushrod lines up better with the adjustable connector.

❑ While holding the carburetor barrel fully closed, install and tighten the grub screw in the top of the adjustable servo connector.

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❑ Use wire cutters to cut away and remove the excess pushrod wire.

❑ Install and tighten the servo horn retaining screw to hold the servo horn securely to the servo.

❑ Operate the throttle several times to ensure that the pushrod wire does not bind.

SECTION 14: RUDDER CONTROL SYSTEM INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

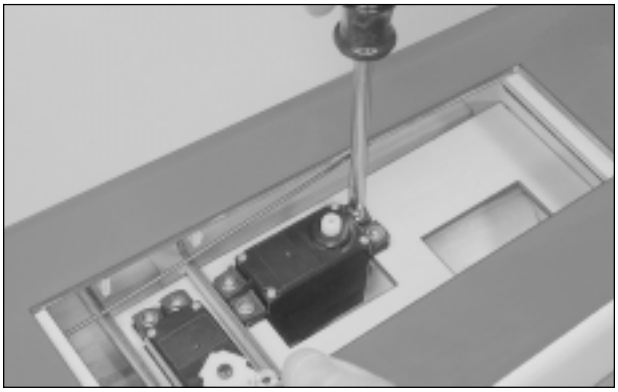
- ❑ (1) Adjustable Servo Connector Assembly
- ❑ (1) 8-1/2" Threaded Wire w/90º Bend
- ❑ (1) Nylon Clevis
- ❑ (1) Nylon 90º Snap Keeper

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond Thin C/A
- ❑ # 1 Phillips Head Screwdriver
- ❑ 1.5mm Hex Wrench
- ❑ Wire Cutters
- ❑ Needle Nose Pliers
- ❑ Excel Modeling Knife
- ❑ Electric Drill
- ❑ 1/16" & 5/64" Drill Bits
- ❑ Ernst Airplane Stand
- ❑ Ruler
- ❑ Masking Tape

STEP 1: INSTALLING THE RUDDER SERVO

❑ Install the rubber grommets and brass collets onto your rudder servo, making sure to install the collets with the flanges toward the bottom of the servo.

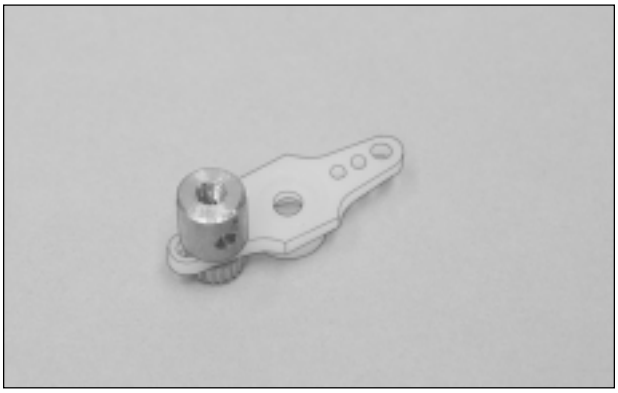


❑ Install the rudder servo into the left-side cutout in the plywood servo tray, as shown. Again, make sure to drill 1/16" diameter pilot holes for the mounting screws.

✦IMPORTANT✦ The rudder servo should be pushed up against the side of the servo cutout (nearest the fuselage side) and the servo output shaft should be toward the back of the fuselage, too.

STEP 2: INSTALLING THE RUDDER PUSHROD ASSEMBLY

❑ Using a modeling knife, cut away and remove two arms from a "4-point" servo horn.



❑ Enlarge the hole in one remaining servo arm that is 5/16" out from the center of the servo arm, using a 5/64" diameter drill bit, then enlarge the hole in the second remaining servo arm that is 7/16" out from the center of the servo arm, using a 5/64" diameter drill bit.

❑ Install the adjustable servo connector into the hole that is 5/16" out from the center of the servo arm, making sure to apply a drop of thin C/A to the connector nut so it does not come loose during flight.

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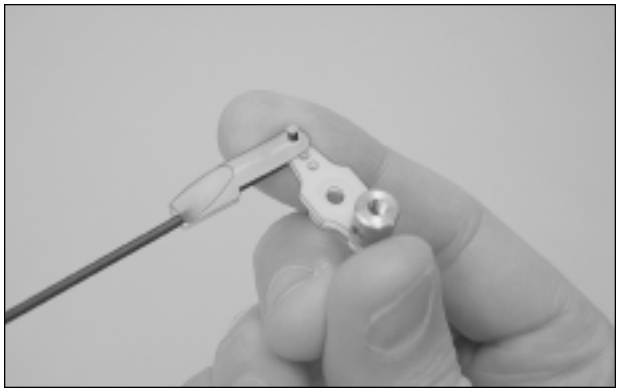
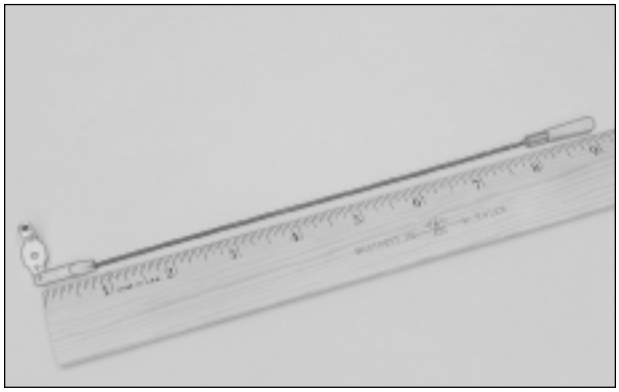


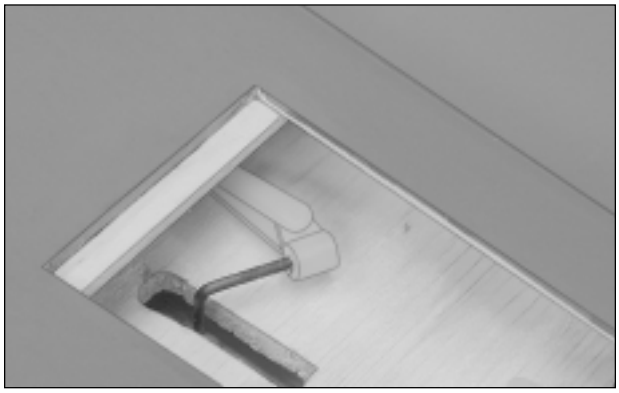
❑ Install the 90º bend in the 8-1/2" long threaded rudder pushrod wire into the hole that is 7/16" out from the center of the servo arm, using the nylon snap keeper provided. When installing the snap keeper, make sure it "snaps" firmly into place over the pushrod wire.

☞ The pushrod wire should be orientated on the bottom of the servo arm, as shown.



❑ Thread the nylon clevis onto the rudder pushrod wire. When the clevis is in the correct position, the distance between the 90º bend in the pushrod wire and the nylon clevis pin should be 9".

☞ Hold the pushrod wire with a pair of pliers to prevent it from turning while installing the clevis.

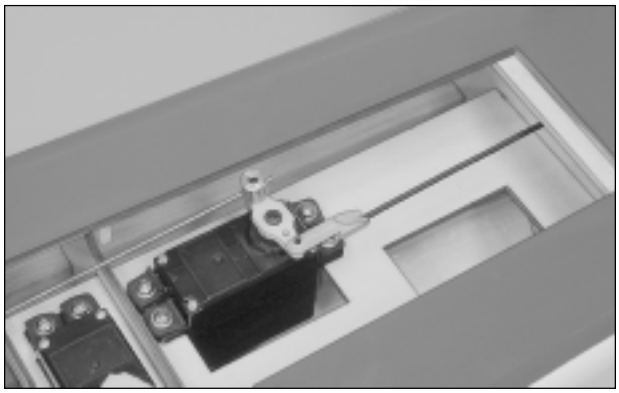


❑ Slide the pushrod assembly into the servo hatch and through the support bulkheads in front of the rudder torque rod.

❑ Carefully snap the clevis into the nylon adjustable rudder control horn.

❑ Use a couple of pieces of masking tape, taped between the rudder and the stabilizer, to hold the rudder centered.

❑ Connect your radio system and plug the rudder servo into the receiver. Double-check that the rudder trim lever on your transmitter is centered.



❑ Slide the adjustable servo connector/servo horn assembly over the plain end of the steering pushrod wire, then install the servo horn onto the servo, making sure that it's centered, as shown.

☞ You may need to adjust the nylon clevis so that the servo horn assembly can be centered on your servo.

❑ Install the servo horn retaining screw to secure the servo horn to the servo.

❑ While holding the nose wheel straight, install and tighten the grub screw in the top of the adjustable servo connector.

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❑ Remove the masking tape from the rudder and double-check that the servo arm, the rudder and the nose wheel are still centered. If the rudder and/or nose wheel are not centered, adjust the nylon clevis and/or steering pushrod wire until they are. Move the rudder right and left several times to ensure that the linkage assemblies do not bind. Double-check that the nose wheel moves in the same direction as the rudder, too.

SECTION 15: ELEVATOR CONTROL SYSTEM INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

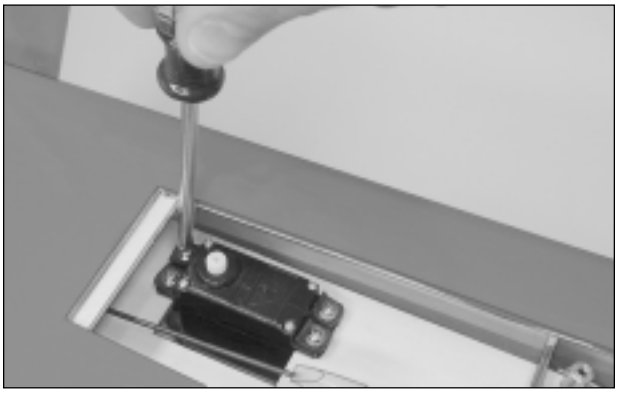
- ❑ (1) 8-1/2" Threaded Wire w/90º Bend
- ❑ (1) 6-3/4" Threaded Wire w/Plain End
- ❑ (2) Nylon Clevises
- ❑ (1) Nylon 90º Snap Keeper
- ❑ (2) Wheel Collars
- ❑ (2) M3 x 8mm Machine Screws

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond Thin C/A
- ❑ # 1 & # 2 Phillips Head Screwdrivers
- ❑ Needle Nose Pliers
- ❑ Excel Modeling Knife
- ❑ Electric Drill
- ❑ 1/16" & 5/64" Drill Bits
- ❑ Ernst Airplane Stand
- ❑ Ruler
- ❑ Pencil
- ❑ Masking Tape

STEP 1: INSTALLING THE ELEVATOR SERVO

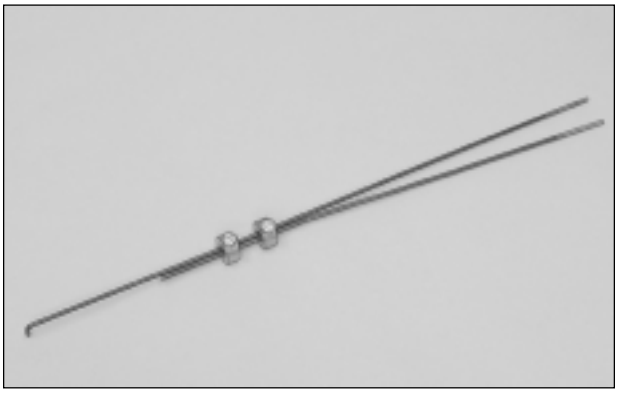
❑ Install the rubber grommets and brass collets onto your elevator servo, making sure to install the collets with the flanges toward the bottom of the servo.



❑ Install the elevator servo into the right-side cutout in the plywood servo tray, as shown. Again, make sure to drill 1/16" diameter pilot holes for the mounting screws.

◆IMPORTANT◆ The elevator servo should be pushed up against the side of the servo cutout (nearest the fuselage side) and the servo output shaft should be toward the back of the fuselage, too.

STEP 2: INSTALLING THE ELEVATOR PUSHROD ASSEMBLY



❑ Using the full-size drawing on page # 42, assemble the elevator pushrod assembly, using two wheel collars and two M3 x 8mm machine screws to secure the two pushrod wires firmly together.

◆IMPORTANT◆ Adjust the pushrod wires so that both threaded ends are even with each other. When tightening the machine screws, make sure both pushrods stay flat and don't twist up.

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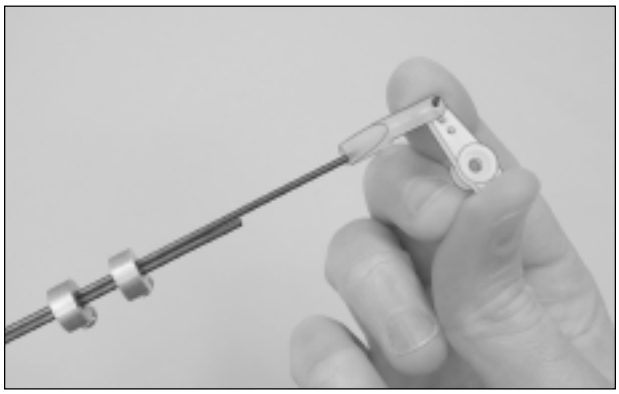
◆**IMPORTANT**◆ Before installing the elevator pushrod assembly, it's very important to apply a couple of drops of thin C/A to the machine screws in the wheel collars that secure the two elevator pushrod wires together. This will prevent the screws from loosening during flight. Do not omit this procedure or failure of the elevator control system could result!

It's important that you install the wheel collars in the location shown on the full-size drawing. This will prevent the wheel collars from hitting or otherwise interfering with the plywood support bulkheads in the back of the fuselage. Positioning the wheel collars further forward or further back could result in them hitting the plywood support bulkheads during use.

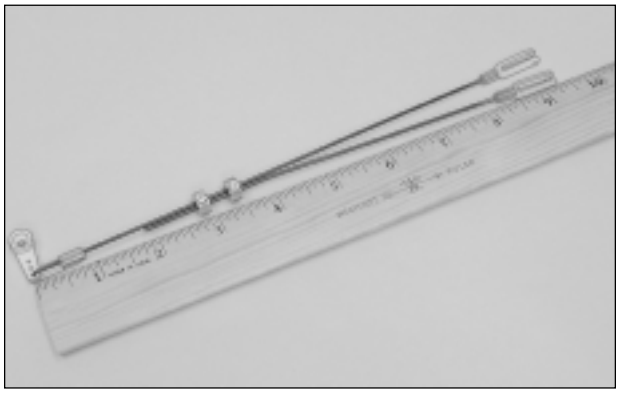
❑ Using a modeling knife, cut away all but one arm from a "4-point" servo horn.

❑ Enlarge the hole in the servo arm that is 9/16" out from the center of the servo arm, using a 5/64" diameter drill bit.



❑ Install the 90º bend in the threaded elevator pushrod wire into the hole that you just enlarged, using the nylon snap keeper provided. When installing the snap keeper, make sure it "snaps" firmly into place over the pushrod wire.

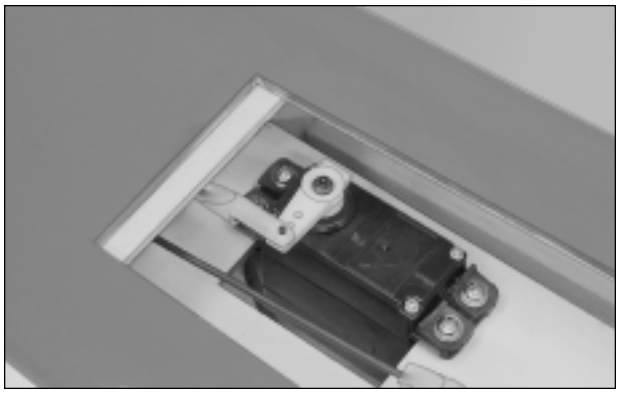
☞ The pushrod wire should be orientated on the bottom of the servo arm, as shown.



❑ Thread one nylon clevis onto each elevator pushrod wire. When the clevises are in the correct position, the distance between the 90º bend in the pushrod wire and the nylon clevis pins should be 9-3/16".

☞ Hold the pushrod wires with a pair of pliers to prevent them from turning while installing the clevises.

❑ Connect your radio system and plug the elevator servo into the receiver. Double-check that the elevator trim lever on your transmitter is centered.



❑ Slide the pushrod assembly into the servo hatch and through the support bulkheads.

❑ Install the servo horn onto your servo, making sure that it's centered and pointing toward the middle of the fuselage, as shown.

❑ Install and tighten the servo horn retaining screw to secure the servo horn to the servo.

❑ Use a couple of pieces of masking tape, taped between the elevator halves and the stabilizer, to hold the elevator halves centered.

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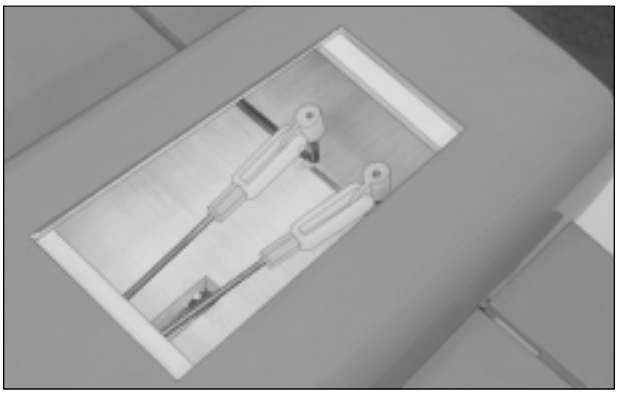


❑ Carefully snap the clevises into the nylon adjustable elevator control horns.

☞ You may need to adjust the nylon clevises so that the elevator halves stay centered.

❑ Remove the masking tape from the elevator halves and double-check that the servo arm and the elevator halves are still centered. If the elevator halves are not centered, adjust the clevises until they are. Move the elevator halves up and down several times to ensure that the linkage assembly does not bind.

◆IMPORTANT◆ You will need to use a modeling knife to carefully notch the trailing edge of the stabilizer to allow clearance for the elevator torque rods to pivot forward. The notches don't need to be very large, so make them as small as possible to ensure the integrity of the stabilizer.

SECTION 16: AILERON CONTROL SYSTEM INSTALLATION

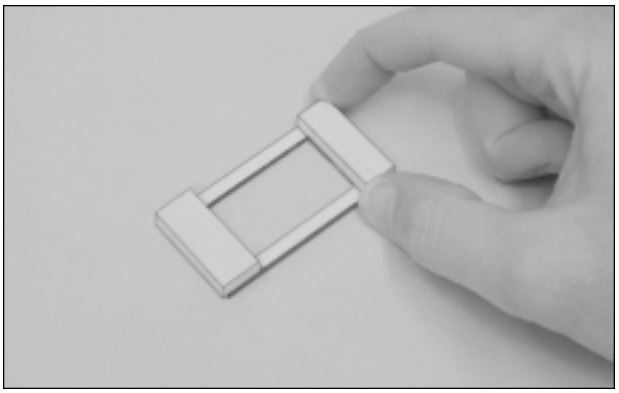
YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

- ❑ (2) 3-1/2" Threaded Wires w/90º Bend
- ❑ (2) Nylon Clevises
- ❑ (2) Nylon 90º Snap Keepers
- ❑ (2) Nylon Adjustable Control Horns
- ❑ (2) Plywood Servo Tray Mounting Blocks (W26)
- ❑ (1) Plywood Servo Tray (W18)

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond Thick C/A
- ❑ Kwik Bond 5 Minute Epoxy
- ❑ # 1 Phillips Head Screwdriver
- ❑ Needle Nose Pliers
- ❑ Excel Modeling Knife
- ❑ Electric Drill
- ❑ 1/16" & 5/64" Drill Bits
- ❑ Ernst Airplane Stand
- ❑ Ruler
- ❑ Pencil
- ❑ Masking Tape
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

STEP 1: INSTALLING THE AILERON SERVO TRAY



❑ Using a generous amount of thick C/A, glue the two plywood servo tray mounting blocks to the servo tray. When gluing the blocks into place, the inside edge of each block should be even with the inside edge of the servo cutout.

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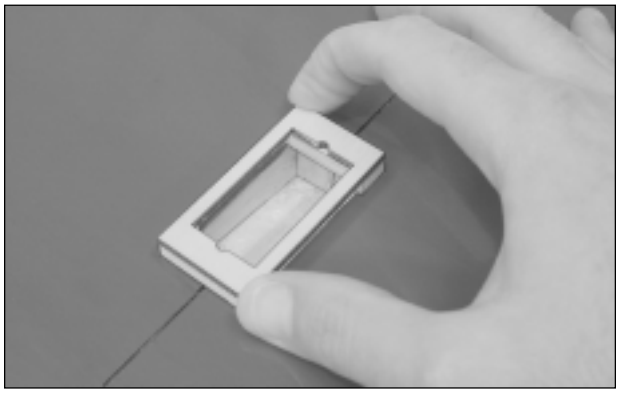


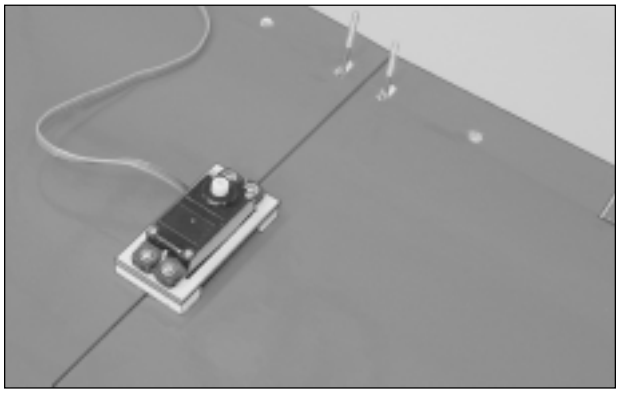
❑ Center the servo tray over the servo cutout in the top of the wing, and while holding the servo tray in place, trace around it using a pencil.

❑ Remove the servo tray and use a modeling knife to cut away and remove the covering material from within the outline you drew.

❑ Glue the servo tray to the wing, using a generous amount of 5 minute epoxy. Remove any excess epoxy, using a paper towel and rubbing alcohol, and allow the epoxy to set up before proceeding.

STEP 2: INSTALLING THE AILERON SERVO

❑ Install the rubber grommets and brass collets onto your aileron servo, making sure to install the collets with the flanges toward the bottom of the servo.



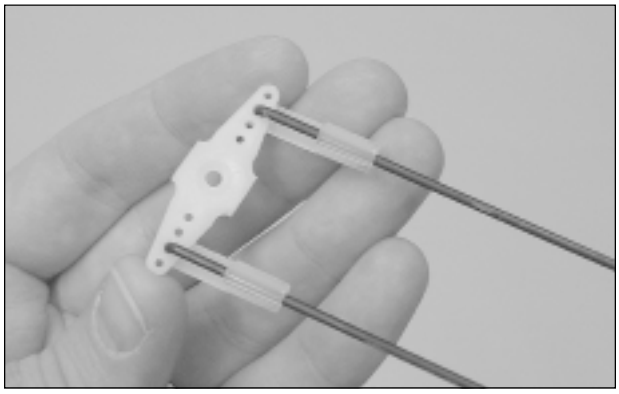
❑ Install the aileron servo into the plywood servo tray, as shown. Again, make sure to drill 1/16" diameter pilot holes for the mounting screws.

◆**IMPORTANT**◆ The servo output shaft should be toward the trailing edge of the wing.

STEP 3: INSTALLING THE AILERON PUSHROD ASSEMBLY

❑ Using a modeling knife, cut away and remove two arms from a "4-point" servo horn.

❑ Enlarge the hole in each remaining servo arm that is 9/16" out from the center of the servo arm, using a 5/64" diameter drill bit.



❑ Install the 90º bend in each 3-1/2" long threaded aileron pushrod wire into the holes that you just enlarged, using the nylon snap keepers provided. When installing the snap keepers, make sure they "snap" firmly into place over the pushrod wires.

☞ The pushrod wires should be orientated on top of the servo arms, as shown.

❑ Connect your radio system and plug the aileron servo into the receiver. Double-check that the aileron trim lever on your transmitter is centered.

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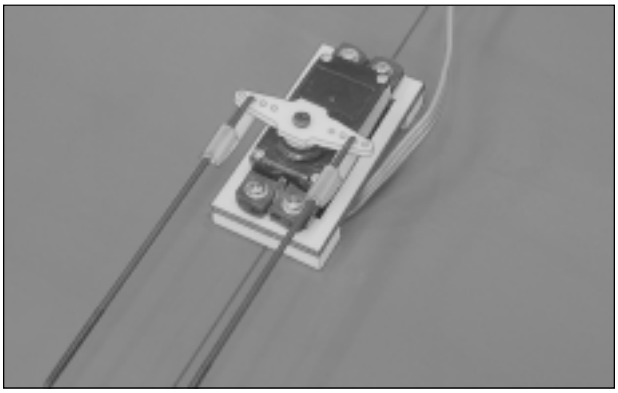
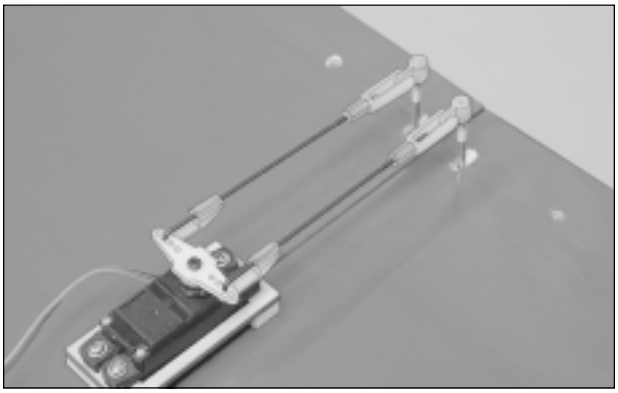


❑ Install the servo horn onto your servo, making sure that it's centered, as shown.

❑ Install and tighten the servo horn retaining screw to secure the servo horn to the servo.

❑ Use a couple of pieces of masking tape, taped between the ailerons and the wing, to hold the ailerons centered.



❑ Carefully thread one nylon adjustable control horn (large thread) onto each threaded aileron torque rod wire. The control horns should both face the aileron servo and they both should be flush with the top of the torque rod wires, too.

❑ Thread one nylon clevis onto each pushrod wire and snap the clevises into the adjustable control horns.

☞ Hold the pushrod wires with a pair of pliers to prevent them from turning while installing the clevises.

❑ Remove the masking tape from the ailerons and double-check that the servo arm and the ailerons are still centered. If the ailerons are not centered, adjust the clevises until they are. Move the ailerons up and down several times to ensure that the linkage assembly does not bind.

SECTION 17: COWLING INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

- ❑ (1) Fiberglass Cowling
- ❑ (3) M3 x 6mm Wood Screws

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond Thin C/A
- ❑ # 1 Phillips Head Screwdriver
- ❑ Excel Modeling Knife
- ❑ Electric Drill
- ❑ 1/16" & 5/64" Drill Bits
- ❑ Ernst Airplane Stand
- ❑ Rotary Tool w/Cutting Disc & Sanding Drum
- ❑ Ruler
- ❑ Pencil
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Masking Tape
- ❑ Paper Towels

STEP 1: ALIGNING THE COWLING

❑ Remove the needle valve assembly and muffler from your engine and set them aside.

✦**WARNING**✦ To prevent dust and debris from entering your engine during the fitting and aligning of the cowling, we strongly suggest covering the engine exhaust port, carburetor opening and needle valve inlet with small pieces of paper towel.

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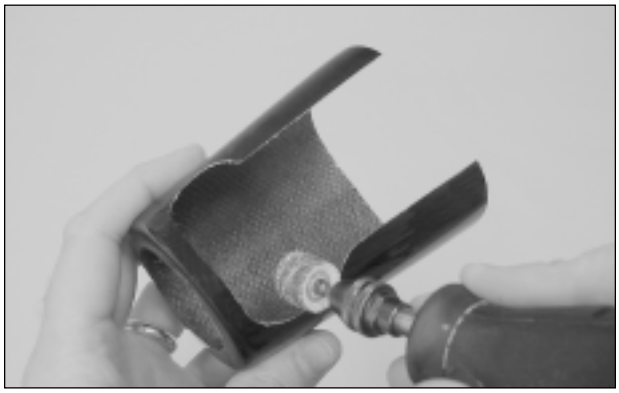
◆IMPORTANT◆ Before cutting out the cowling to fit over your engine, notice that the cowling has a top and a bottom. The bottom of the cowling is straight and the top of the cowling is angled down to match the angle of the top of the fuselage.



❑ When installed, the cowling will fit around the narrow plywood cowling mounting ring and butt up against the front of the fuselage. Carefully measure and mark the portion of the cowling that must be removed to clear your engine's cylinder head, muffler and carburetor.

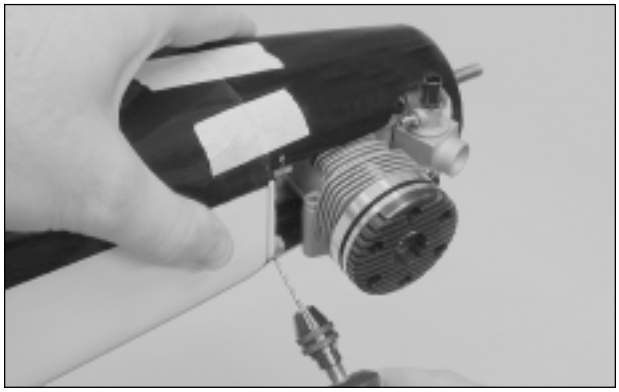
❑ Carefully make the cutout, using a rotary tool with first a cutting disc and then a sanding drum. Work slowly, checking the fit often, so you don't remove too much of the cowling or damage it.

❑ Slide the cowling over the engine and onto the fuselage.

❑ Line up the front of the cowling, using your engine's drive washer as a guide. When aligned properly, the cowl ring should be centered around the drive washer and the back edge of the cowling should butt up against the front of the fuselage. The front of the drive washer should be about 3/32" in front of the cowling, too, to allow space for your spinner backplate.

❑ When satisfied with the alignment, use pieces of masking tape to hold the cowling securely in place and aligned.

STEP 2: INSTALLING THE COWLING



❑ With the cowling held firmly in alignment, drill 1/16" diameter pilot holes into the cowling and through the cowling mounting blocks for the three wood screws, making sure that you drill the holes 3/16" in front of the back edge of the cowling.

◆IMPORTANT◆ The cowling mounting block on the left side of the firewall is located approximately 3/4" below the seam of the black covering material.

☞ If you drill the holes farther forward than 3/16", they may miss the cowling mounting blocks.

❑ Remove the cowling and enlarge **only** the holes in the cowling, using a 5/64" diameter drill bit.

◆IMPORTANT◆ Enlarging the holes will prevent the fiberglass from being cracked when you install the wood screws.

❑ To strengthen the holes in the cowling mounting blocks that the wood screws will thread into, carefully apply a couple of drops of thin C/A into the holes and let it dry completely before installing the cowling.

❑ Slide the cowling into position and realign it. Install and tighten the three M3 x 6mm wood screws to hold the cowling firmly in place.

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❑ Install your muffler, high speed needle valve, propeller and spinner. To finish off the assembly, cut to length and install the fuel pick-up and pressure lines from the fuel tank to your engine's carburetor and muffler.

SECTION 18: FINAL ASSEMBLY

YOU'LL NEED THE FOLLOWING PARTS FROM THE KIT:

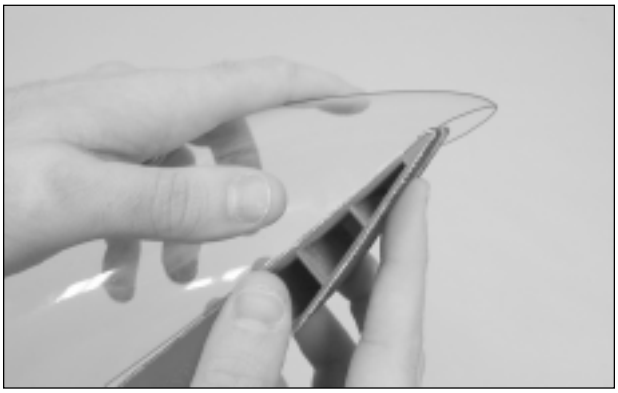
- ❑ (1) Clear Canopy
- ❑ (9) M2 x 10mm Flange-Head Wood Screws
- ❑ (1) Decal Set

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Pacer Formula 560 Canopy Glue
- ❑ # 1 Phillips Head Screwdriver
- ❑ Excel Modeling Knife
- ❑ Scissors
- ❑ Electric Drill
- ❑ 1/16" Drill Bit
- ❑ Ernst Airplane Stand
- ❑ Ruler
- ❑ Pencil
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Masking Tape
- ❑ Paper Towels

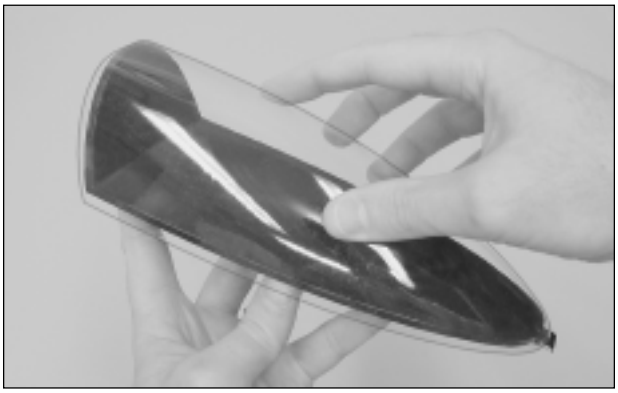
STEP 1: INSTALLING THE CANOPY

❑ Using a pair of scissors, carefully cut out the canopy along the molded scribe line.



❑ Using 220 grit sandpaper with a sanding block, carefully sand the edges of the canopy smooth and straight.

◆**WARNING**◆ Be careful not to let the sandpaper scratch the canopy.



❑ Set the canopy onto the fuel tank hatch cover and align it.

☞ Notice that the edges of the canopy overhang the edges of the fuel tank hatch cover. This is normal and will allow you to custom-fit the canopy and cut away the excess, resulting in a perfect fit. **Don't cut away the excess until after you've glued the canopy to the fuel tank hatch cover.**

❑ When satisfied with the fit, remove the canopy and carefully apply a thin bead of Pacer Formula 560 Canopy Glue around the edges of the fuel tank hatch cover.

❑ Set the canopy back into place and realign it. Use pieces of masking tape to hold the edges of the canopy firmly in place and remove any excess adhesive, using a paper towel soaked with **water.** Allow the glue to fully cure before removing the masking tape.

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STEP 2: INSTALLING THE FUEL TANK HATCH COVER ASSEMBLY

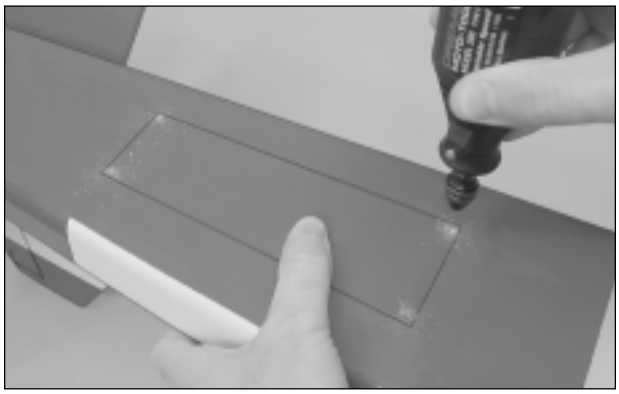
❑ Using a pair of scissors, carefully cut the excess canopy material flush with the fuel tank hatch cover.

❑ Place the fuel tank hatch cover assembly back onto the fuselage and push the mounting tab down firmly into the notch.

❑ Using a drill with a 1/16" diameter drill bit, drill a hole into the mounting tab and through the fuselage.

❑ Carefully secure the fuel tank hatch cover assembly to the fuselage, using one M2 x 10mm flange-head wood screw.

STEP 3: INSTALLING THE SERVO & CONTROL SYSTEM HATCH COVERS



❑ Set the servo hatch cover into place. If should fit firmly into position and be flush with the bottom of the fuselage.

❑ Using a drill with a 1/16" diameter drill bit, drill four pilot holes through the hatch cover for the mounting screws. Position each of the holes 1/8" in from each corner of the servo hatch cover.

❑ Carefully secure the servo hatch cover to the fuselage, using four M2 x 10mm flange-head wood screws.

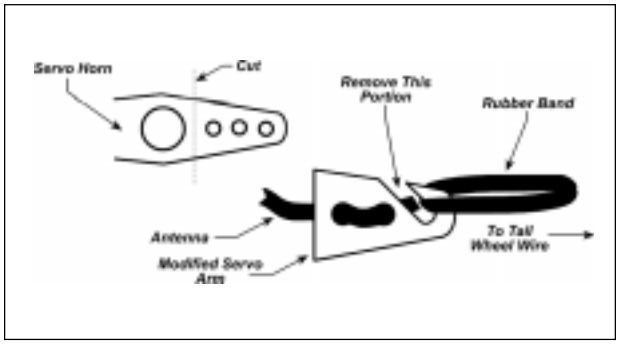
❑ Repeat the procedures above to install the control system hatch cover to the bottom of the fuselage. It is held in place using four M2 x 10mm flange-head wood screws, too.

STEP 4: INSTALLING YOUR RECEIVER, AIRBORNE BATTERY & SWITCH

PRO TIP We don't suggest permanently installing the receiver and battery until you have balanced the airplane. How the airplane initially balances will determine where you need to mount the receiver and battery.

❑ Wrap the receiver and battery in foam rubber to protect them from vibration. Use masking tape or rubber bands to hold the foam in place. Do not wrap the foam rubber too tightly or the vibration dampening quality will be reduced.

❑ After you've found the final location of the receiver and battery, mount them into the fuselage using your favorite method. Strips of Velcro® work well or sandwich them in place using a couple of scraps of balsa wood glued between the fuselage sides.



❑ After installing the receiver, drill a 5/64" diameter hole through the fuselage for the antenna to exit. Unwrap the receiver antenna and feed it out through the hole.

❑ Using a modeling knife, carefully make an antenna mount out of an extra servo horn. Remove one of the arms and cut it into the shape shown.

❑ Use the modified servo arm and a rubber band and T-Pin to secure the end of the antenna to the back of the fuselage.

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❑ Mount the switch to the fuselage side (opposite the muffler) and connect the battery lead to the switch, and the switch and servo leads to the receiver.

STEP 5: APPLYING THE DECALS

❑ Using a clean cloth, wipe the airframe down completely to remove any dust, debris and oil. We suggest using rubbing alcohol to wipe the airframe down in the areas where the decals will be applied.

❑ Cut out each of the decals and apply them, using the box cover photos for reference.

PRO TIP If any air bubbles form under the decals you can "prick" the bubbles with a pin to release the air.

SECTION 19: BALANCING THE F-20 TIGERSHARK 40 ARF

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

❑ Ruler

❑ Masking Tape

✦**IMPORTANT**✦ It is critical that your airplane be balanced correctly. Improper balance will cause your airplane to lose control and crash!

Center of Gravity Location:
5-1/2" - 6" back from the leading edge of the wing, measured at the fuselage sides.

✦**WARNING**✦ This is the recommended C/G range. For test-flying we suggest you start with the C/G in the middle of the range (5-3/4"), then move it farther back as you become familiar with the flying characteristics of the airplane. It is not recommended that the C/G be located any farther back than 6".

☞ Balance the F-20 Tigershark 40 ARF with the fuel tank **empty.**

❑ Install the wing onto the fuselage. Apply two short pieces of masking tape onto the **top** of the wing, **5-3/4" back from the leading edge, measured at the fuselage sides.**

❑ Turn the airplane upside down and place your fingers on the masking tape, and carefully lift the airplane. If the nose of the airplane falls, the airplane is nose heavy. To correct this, move the battery pack and/or receiver back far enough to bring the airplane into balance. If the tail of the airplane falls, the airplane is tail heavy. To correct this, move the battery pack and/or receiver forward far enough to bring the airplane into balance. When balanced correctly, the airplane should sit level or slightly nose down when you lift it up with your fingers at the C/G location.

☞ Once you have flown and become familiar with the flight characteristics of the airplane, the C/G can be moved fore or aft within the C/G range to change the flight performance. Moving the C/G back will cause the airplane to be more responsive, but less stable. Moving the C/G forward will cause the airplane to be more stable, but less responsive.

DO NOT FLY THE AIRPLANE BEYOND THE RECOMMENDED BALANCE RANGE OR AN UNCONTROLLABLE CRASH COULD RESULT!

SECTION 20: CONTROL THROWS

We recommend setting up the F-20 Tigershark 40 ARF using the control throws listed below. These control throws are suggested for initial test-flying because they will allow the airplane to fly smoother and make it easier to control.

TEST-FLYING

Ailerons:	**3/16" Up**	**3/16" Down**
Elevator:	**3/16" Up**	**3/16" Down**
Rudder:	**1" Right**	**1" Left**

◆**IMPORTANT**◆ The control throws are measured from the widest point of the control surfaces.

◆**VERY IMPORTANT**◆ After you are finished adjusting the pushrods and control throws, we strongly suggest cutting 1/4" lengths of the clear tubing provided and sliding one piece over each clevis. The tubing will prevent the clevises from popping open during flight.

Once you're familiar with the flight characteristics of the airplane, you might want to increase the control throws to the sport-flying settings listed below. These control throws will make the airplane more responsive and allow you to do most aerobatics with ease.

SPORT-FLYING

Ailerons:	**5/16" Up**	**5/16" Down**
Elevator:	**5/16" Up**	**5/16" Down**
Rudder:	**1-3/4" Right**	**1-3/4" Left**

◆**IMPORTANT**◆ The control throws are measured from the widest point of the control surfaces.

◆**VERY IMPORTANT**◆ We do not suggest increasing the control throws beyond the recommended sport-flying settings unless you are a very proficient flyer. Higher control throws will cause the airplane to be extremely control-sensitive and result in a possible crash if you are not careful.

SECTION 21: PREFLIGHT CHECK & SAFETY

WARNING ABOUT THROTTLE MANAGEMENT

It is very important that you understand throttle management. In a nutshell, this means no full throttle dives. Full throttle dives should be avoided so as not to cause control surface flutter and/or airframe failure. When the nose of the airplane drops, decrease the throttle.

- Completely charge the transmitter and receiver batteries before your first day of flying.
- Check every bolt and every glue joint in the airplane to ensure that everything is tight and well-bonded. This should include all of the control surface hinges as well.
- Double-check that you've installed and tightened all of the servo horn retaining screws.
- Double-check that the receiver and battery are properly secured in the fuselage. There's nothing worse than the battery pack coming loose during flight.

Continued On Next Page ☛

PREFLIGHT CHECK & SAFETY, CONTINUED....

- Double-check the balance of the airplane. **Do this with the fuel tank EMPTY.**

- Check the control surfaces. They should all move in the correct direction and not bind.

- Make sure that you've installed 1/4" long pieces of clear tubing over the clevises to prevent them from opening during flight.

- If your radio transmitter is equipped with dual rate switches, double-check that they are on the low-rate setting for your first few flights.

- Check to ensure that all of the control surfaces are moving the proper amount in both low and high rate settings.

- Check the receiver antenna. It should be fully extended and not coiled up inside the fuselage.

- Properly balance the propeller. A propeller that is out of balance will cause excessive vibration, which could lead to engine and/or airframe failure, and it will reduce engine efficiency and power.

The following are our general guidelines for your safety and the safety of others. Please read and understand these safety guidelines before going out to the flying field for the first time.

- Do not test-fly your model for the first time without first having it safety-checked by an experienced modeler.

- Do not fly your model higher than approximately 400 feet within 3 miles of an airport without having an observer with you. The observer should tell you about any full-size aircraft in your vicinity and you should always give the right-of-way to full-scale aircraft.

- When flying at a flying field with established rules, you should abide by those rules. You should not deliberately fly your model in a reckless and/or dangerous manner.

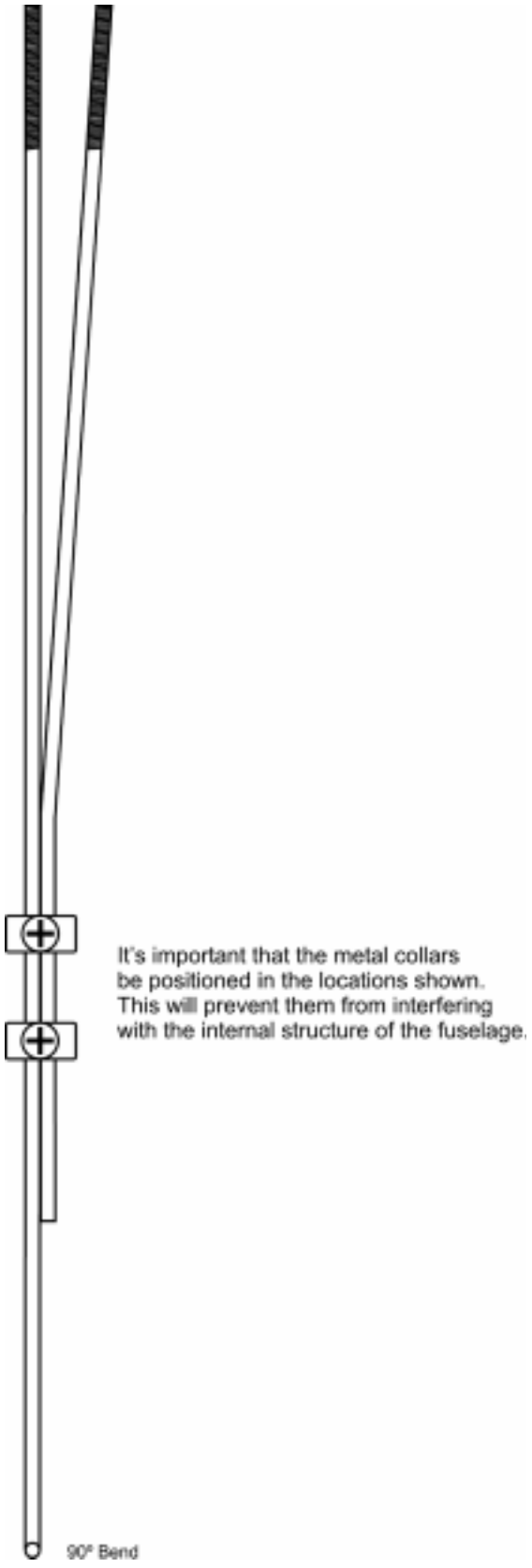
- While flying, you should not deliberately fly behind the flight line. If your model should inadvertently fly behind the flight line, you should change course immediately.

- You should complete a successful range check of your radio equipment prior to each new day of flying, or prior to the first flight of a new or repaired model.

- You should perform your initial turn after take- off away from the flightline and/or spectator area.

- You should not knowingly operate your R/C radio system within 3 miles of a preexisting model club flying field without a frequency sharing agreement with that club.

Full-Size Elevator Pushrod Assembly Template


It's important that the metal collars
be positioned in the locations shown.
This will prevent them from interfering
with the internal structure of the fuselage.
90° Bend

Cut Along Dotted Line

PRODUCT EVALUATION SHEET

Telling us what you like and don't like determines what model kits we make and how we make them. We would appreciate it if you would take a few minutes of your time to answer the following questions about this kit and your modeling interests. Simply fold this form on the dotted lines, seal with tape and mail it to us. *Do not use staples and make sure our address faces out.*

Global Hobby Distributors will not disclose the information it collects to outside parties. Global Hobby Distributors does not sell, trade, or rent your personal information to others. Your privacy is important to us.

1) Kit: **Sportsman Aviation**
F-20 Tigershark 40 ARF # 127520

2) Where did you learn about this kit?
- ❑ Magazine Ads
- ❑ Hobby Shop
- ❑ Internet
- ❑ Friend
- ❑ Other

3) What influenced you the most to buy this kit?
- ❑ Magazine Ads
- ❑ Type of Model
- ❑ Recommendation
- ❑ Internet
- ❑ Price
- ❑ Box Art
- ❑ Other

4) Did you have any trouble understanding the written instructions? If yes, please explain.
- ❑ Yes
- ❑ No

5) Did you have any trouble understanding any of the photographs? If yes, please explain.
- ❑ Yes
- ❑ No

6) Were any of the kit parts:
- ❑ Damaged
- ❑ Missing
- ❑ Wrong Size
- ❑ Wrong Shape

If you checked any of the boxes above, did you contact our Customer Service Department to resolve the problem?
- ❑ Yes
- ❑ No

7) Was any of the assembly difficult for you? If yes, please explain.
- ❑ Yes
- ❑ No

8) What did you like most about this kit?
- ❑ Assembly Manual
- ❑ Hardware Supplied
- ❑ Other
- ❑ Parts Fit
- ❑ Price

9) What did you like least about this kit?
- ❑ Assembly Manual
- ❑ Hardware Supplied
- ❑ Other
- ❑ Parts Fit
- ❑ Price

10) Are you satisfied with the finished model? If no, please explain.
- ❑ Yes
- ❑ No

11) How does this kit compare to similar kits by other manufacturers?
- ❑ Better
- ❑ As Good

What is Your Age Group:
❑ 10 & Under ❑ 11 - 20 ❑ 21 - 30 ❑ 31 - 40 ❑ 41 - 50 ❑ 51 - 60 ❑ 61 - 70 ❑ 71 +

How Many Years Have You Been in the Hobby?
❑ Less than 1 ❑ 2 - 4 ❑ 5 - 7 ❑ 8 - 10 ❑ 11 - 15 ❑ 16 - 20 ❑ 20 or More

How Many Models Have You Purchased In the Last Year?
❑ 0 - 1 ❑ 2 - 4 ❑ 5 - 7 ❑ 8 - 10 ❑ 10 or More

Please List any Other Modeling Interests or any Additional Information about This Product: _____

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